

**Area Management Report for the Sport Fisheries of
the North Gulf Coast, 2010–2015**

by

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and

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November 2016

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Mathematics, statistics			
centimeter	cm	Alaska Administrative Code	AAC	all standard mathematical signs, symbols and abbreviations			
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H _A		
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	<i>e</i>		
hectare	ha			catch per unit effort	CPUE		
kilogram	kg			coefficient of variation	CV		
kilometer	km	at	@	common test statistics	(F, t, χ^2 , etc.)		
liter	L			confidence interval	CI		
meter	m			compass directions:	correlation coefficient		
milliliter	mL	east	E	(multiple)	R		
millimeter	mm	north	N	correlation coefficient			
Weights and measures (English)		south	S	(simple)	r		
	cubic feet per second	ft ³ /s	west	W	covariance	cov	
	foot	ft	copyright	©	degree (angular)	°	
	gallon	gal	corporate suffixes:		degrees of freedom	df	
	inch	in	Company	Co.	expected value	<i>E</i>	
	mile	mi	Corporation	Corp.	greater than	>	
	nautical mile	nmi	Incorporated	Inc.	greater than or equal to	≥	
	ounce	oz	Limited	Ltd.	harvest per unit effort	HPUE	
	pound	lb	District of Columbia	D.C.	less than	<	
	quart	qt	et alii (and others)	et al.	less than or equal to	≤	
	yard	yd	et cetera (and so forth)	etc.	logarithm (natural)	ln	
	Time and temperature		exempli gratia		logarithm (base 10)	log	
		day	d	(for example)	e.g.	logarithm (specify base)	log ₂ , etc.
		degrees Celsius	°C	Federal Information Code	FIC	minute (angular)	'
		degrees Fahrenheit	°F	id est (that is)	i.e.	not significant	NS
degrees kelvin		K	latitude or longitude	lat or long	null hypothesis	H ₀	
hour		h	monetary symbols		percent	%	
minute		min	(U.S.)	\$, ¢	probability	P	
second		s	months (tables and figures): first three		probability of a type I error		
Physics and chemistry			letters	Jan,...,Dec	(rejection of the null hypothesis when true)	α	
		all atomic symbols		registered trademark	®	probability of a type II error	
		alternating current	AC	trademark	™	(acceptance of the null hypothesis when false)	β
		ampere	A	United States		second (angular)	"
		calorie	cal	(adjective)	U.S.	standard deviation	SD
		direct current	DC	United States of America (noun)	USA	standard error	SE
		hertz	Hz	U.S.C.	United States Code	variance	
	horsepower	hp			population sample	Var	
	hydrogen ion activity (negative log of)	pH	U.S. state	use two-letter abbreviations (e.g., AK, WA)		var	
	parts per million	ppm					
	parts per thousand	ppt, ‰					
	volts	V					
	watts	W					

FISHERY MANAGEMENT REPORT NO. 16-33

**AREA MANAGEMENT REPORT FOR THE SPORT FISHERIES OF THE
NORTH GULF COAST, 2010–2015**

by
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Division of Sport Fish, Research and Technical Services
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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	iii
LIST OF FIGURES	iii
LIST OF APPENDICES	iii
ABSTRACT	1
INTRODUCTION.....	1
AREAWIDE OVERVIEW.....	7
Fishing Effort.....	7
Guide Logbook Overview	8
STOCKED FISHERIES	9
Arctic Grayling and Rainbow Trout	9
Fishery Description.....	9
Fishery Management and Objectives.....	9
Salmon.....	12
Fishery Description.....	12
Fishery Management and Objectives.....	12
CHINOOK SALMON FISHERIES	13
Fishery Description.....	13
Fishery Management and Objectives.....	13
Stocking Program	13
Fishery Performance.....	14
COHO SALMON FISHERIES	16
Fishery Description.....	16
Fishery Management and Objectives.....	16
Stocking Program	17
Fishery Performance.....	21
SOCKEYE SALMON FISHERY	23
Fishery Description.....	23
Fishery Management and Objectives.....	23
Stocking Program	23
Fishery Performance.....	24
PINK SALMON FISHERIES	26
Fishery Description.....	26
Fishery Management and Objectives.....	26
Stocking Program	26
Fishery Performance.....	26
CHUM SALMON FISHERIES.....	28
Fishery Description.....	28
Fishery Management and Objectives.....	28
Stocking Program	28

TABLE OF CONTENTS (Continued)

	Page
Fishery Performance.....	28
DOLLY VARDEN FISHERIES	30
Fishery Description.....	30
Fishery Management and Objectives.....	30
Stocking Program	30
Fishery Performance.....	31
HALIBUT FISHERIES	32
Fishery Description.....	32
Fishery Management and Objectives.....	32
Fishery Performance.....	34
ROCKFISH FISHERIES	36
Fishery Description.....	36
Fishery Management and Objectives.....	36
Fishery Performance.....	37
LINGCOD FISHERIES	39
Fishery Description.....	39
Fishery Management and Objectives.....	39
Fishery Performance.....	40
SHARKS	42
Fishery Description.....	42
Fishery Management and Objectives.....	43
Fishery Performance.....	43
REFERENCES CITED	46
APPENDIX A: NORTH GULF COAST MANAGEMENT PLANS	51

LIST OF TABLES

Table	Page
1. Number of angler-days expended in the North Gulf Coast Management Area compared to Southcentral and statewide, 1996–2015.	3
2. Saltwater sport fishing effort by user group in the North Gulf Coast Management Area, 1996–2015.	4
3. Sport fishing effort for salt and fresh waters in the North Gulf Coast Management Area, 1996–2015.	5
4. Sport fishing harvest by species in the North Gulf Coast Management Area, 1996–2015.	6
5. Hatchery releases of coho and Chinook salmon by location and year for the North Gulf Coast Management Area, 1998–2015.	10
6. Hatchery releases of sockeye salmon, rainbow trout, Arctic grayling by location and year, and total number released including both Tables 5 and 6 by year for the North Gulf Coast Management Area, 1998–2015.	11
7. Chinook salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.	15
8. Historical North Gulf Coast Management Area coho salmon escapement index streams survey data, 1965–1988.	19
9. Coho salmon escapement index streams surveyed in the North Gulf Coast Management Area, 2013–2015.	19
10. Origin of broodstock for coho salmon stocked in Resurrection Bay tributaries, 1965–2015.	20
11. Coho salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.	22
12. Sockeye salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.	25
13. Pink salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.	27
14. Chum salmon catch and harvest, North Gulf Coast Management Area, 1995–2015.	29
15. Dolly Varden catch and harvest in the North Gulf Coast Management Area, 1996–2015.	31
16. Halibut catch and harvest in the North Gulf Coast Management Area, 1996–2015.	35
17. Rockfish catch and harvest in the North Gulf Coast Management Area, 1996–2015.	38
18. Lingcod catch and harvest in the North Gulf Coast Management Area, 1996–2015.	41
19. Shark catch and harvest in the North Gulf Coast Management Area, 1996–2015.	44

LIST OF FIGURES

Figure	Page
1. Map of the North Gulf Coast Management Area and Resurrection Bay Terminal Harvest Area.	2
2. Sport fishing angler effort expended in the North Gulf Coast Management Area compared to the Alaska statewide effort, 2006–2015.	7
3. Saltwater sport fishing effort in the North Gulf Coast Management Area, 2006–2015.	8
4. Chinook salmon catch and harvest in the North Gulf Coast Management Area, 2006–2015.	16
5. Coho salmon stream survey locations in the North Gulf Coast Management Area, 2013–2015.	18
6. Coho salmon catch and harvest in the North Gulf Coast Management Area, 2006–2015.	21
7. Coho salmon harvest by user groups, North Gulf Coast Management Area, 2006–2015.	23
8. Sockeye salmon catch and harvest in the North Gulf Coast Management Area, 2006–2015.	24
9. Pink salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.	26
10. Chum salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.	30
11. Dolly Varden catch and harvest in the North Gulf Coast Management Area, 2006–2015.	32
12. Halibut catch and harvest in the North Gulf Coast Management Area, 2006–2015.	34
13. Halibut catch and harvest by charter and private boat in the North Gulf Coast Management Area, 2006–2015.	36
14. Rockfish catch and harvest in the North Gulf Coast Management Area, 2006–2015.	39
15. Lingcod catch and harvest in the North Gulf Coast Management Area, 2006–2015.	42
16. Shark catch and harvest in the North Gulf Coast Management Area, 2006–2015.	45

LIST OF APPENDICES

Appendix	Page
A1. North Gulf Coast management plans.	52

ABSTRACT

This report provides a detailed summary of the sport fisheries in the North Gulf Coast Management Area. Included are a description and overview of each fishery, how the fisheries are managed, and fishery performance and escapement for 2010 through 2015. The sport fisheries include Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), Pacific halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes* spp. and *Sebastolobus* spp.), lingcod (*Ophiodon elongates*), shellfish, sharks, rainbow trout (*O. mykiss*), and Dolly Varden (*Salvelinus malma*).

Key words: North Gulf Coast Management Area, Alaska Board of Fisheries, Seward, Chinook salmon, coho salmon, sockeye salmon, pink salmon, chum salmon, halibut, rockfish, lingcod, shellfish, sharks, rainbow trout, Dolly Varden, sport fisheries overview

INTRODUCTION

The North Gulf Coast Management Area (NGCMA) consists of all waters between Gore Point (156°96'25"W longitude) and Cape Fairfield (148°50'25"W longitude) (Figure 1). The eastern boundary of the NGCMA used to be located 15 miles farther east at Cape Puget. At the 2008 Alaska Board of Fisheries (BOF) meeting, the eastern boundary was moved to Cape Fairfield to align the commercial, subsistence, and sport fish regulatory boundaries to one location. The City of Seward is the only community in the management area.

The Port of Seward, at the head of Resurrection Bay, is the gateway to sport fishing in the NGCMA. Tourism, including a growing sport fish charter industry, is vital to the economy of Seward. Access to area sport fisheries is by road, rail, air, and boat. Most sport fisheries in the NGCMA require a boat or plane for access, so effort from boat anglers, both private and charter, dominate these fisheries (Tables 1–3). Local Seward beaches, which are adjacent to stocking sites, are the only easily accessible shore fishery for salmon in the NGCMA. In contrast to boat-accessible fisheries, road-accessible streams and lakes provide only minor sport fisheries. Principal land managers include private individuals, the City of Seward, U.S. National Park Service, U.S. Forest Service, Native corporations, and the State of Alaska.

Most area sport fisheries occur in salt water and target 5 species of Pacific salmon (coho or silver [*Oncorhynchus kisutch*], Chinook or king, [*O. tshawytscha*], pink or humpy [*O. gorbuscha*], chum or dog [*O. keta*], sockeye or red [*O. nerka*]), and Dolly Varden (*Salvelinus malma*). NGCMA has one of the largest marine coho salmon fisheries in the Pacific Northwest (Table 4). The Seward Silver Salmon Derby sponsored by the Seward Chamber of Commerce highlights this popular fishery each year in August. Coho salmon are a mix of hatchery and wild fish; Chinook and sockeye salmon are a result of hatchery production; pink and chum salmon and Dolly Varden are all wild fish. The management and allocation of these fisheries is guided by the *Trail Lakes Hatchery Salmon Hatchery Management Plan* (5 AAC 21.373) and the *Resurrection Bay Management Plan* (5 AAC 21.376) (Appendix A1). Groundfish species are also targeted by sport anglers and include Pacific halibut (*Hippoglossus stenolepis*), rockfish (*Sebastes* spp.), and lingcod (*Ophiodon elongates*) (Table 4). When weather permits, charter boats travel daily to the marine waters of Prince William Sound to target the abundant groundfish resources. There is also a relatively small salmon shark (*Lamna ditropis*) fishery.

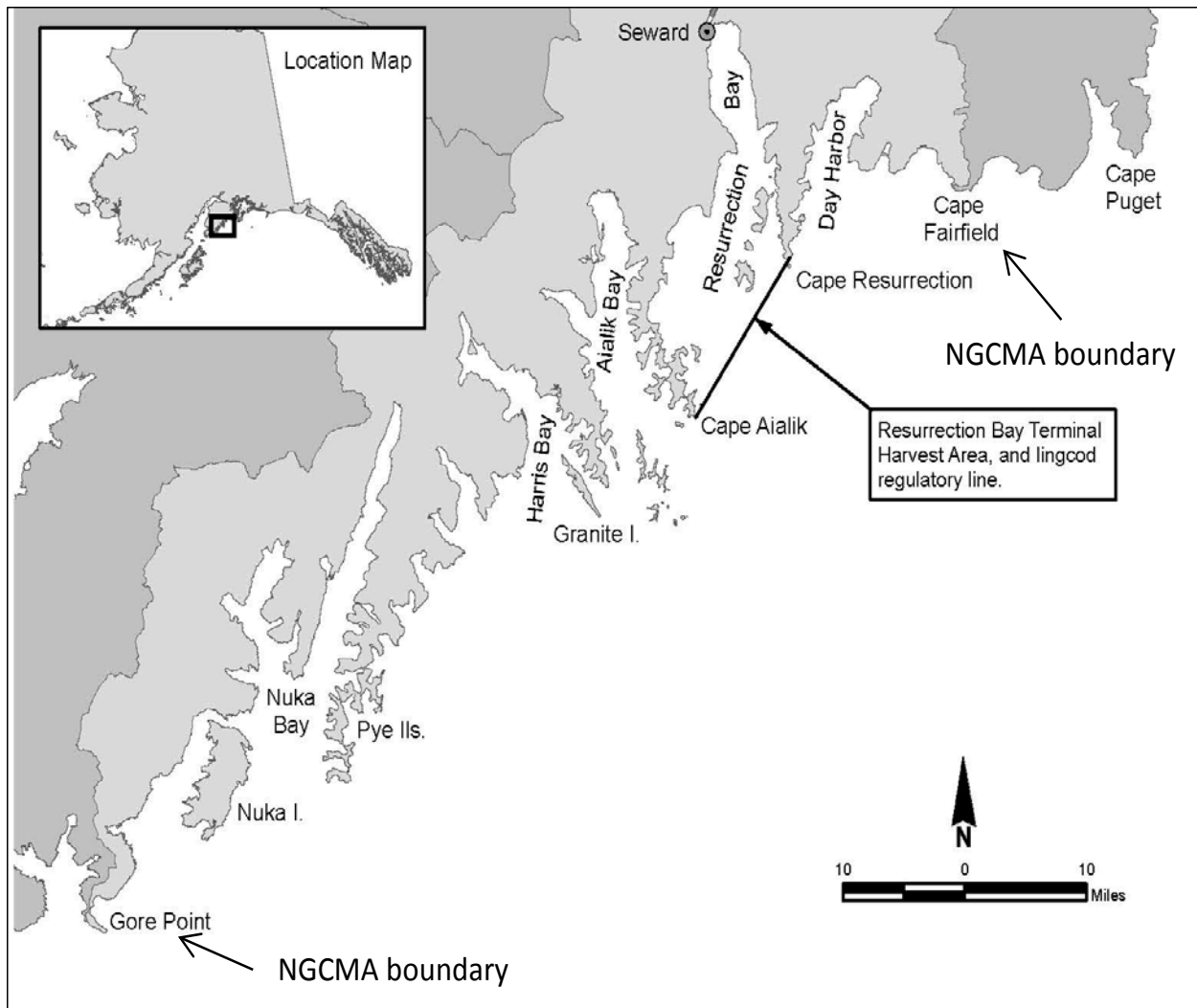


Figure 1.—Map of the North Gulf Coast Management Area and Resurrection Bay Terminal Harvest Area.

With the exception of the Resurrection River drainage downstream of the Seward Highway and Nash Road in Seward, all freshwater drainages in Resurrection Bay are closed to salmon fishing but are open to Dolly Varden, rainbow trout (*O. mykiss*), and Arctic grayling (*Thymallus arcticus*) sport fishing.

All charter boat operators are required to record all fish caught and harvested for each angler, including the captain and crew, in saltwater logbooks issued by the Alaska Department of Fish and Game (ADF&G). Logbooks must be filled in before anglers or fish leave the boat and must be mailed or delivered to the ADF&G office no later than 1 week after the fishing trip. Logbook data are compiled in an ADF&G database and a data summary is published annually. Each fishery will be discussed in greater detail in individual chapters.

Table 1.—Number of angler-days expended in the North Gulf Coast Management Area compared to Southcentral and statewide, 1996–2015.

Year	Effort (angler-days)			Percent of statewide	Percent of southcentral
	Statewide	Southcentral	NGC		
1996	2,006,528	1,434,943	81,699	4	6
1997	2,079,514	1,400,983	90,031	4	6
1998	1,856,976	1,258,482	71,564	4	6
1999	2,499,152	1,659,966	84,742	3	5
2000	2,627,805	1,844,824	83,830	3	5
2001	2,621,941	1,560,562	91,477	3	6
2002	2,259,091	1,569,513	97,351	4	6
2003	2,219,398	1,535,501	95,579	4	6
2004	2,473,961	1,709,671	117,941	5	7
2005	2,461,933	1,712,610	115,605	5	7
2006	2,294,548	1,605,983	102,239	4	6
2007	2,543,674	1,799,352	119,553	5	7
2008	2,315,601	1,622,920	102,635	4	6
2009	2,216,445	1,522,346	99,195	4	7
2010	2,000,167	1,371,492	85,566	4	6
2011	1,919,313	1,326,950	90,812	5	7
2012	1,885,692	1,252,263	72,536	4	6
2013	2,202,957	1,488,383	96,461	4	6
2014	2,309,853	1,571,650	96,940	4	6
2015	2,212,331	1,470,381	95,364	4	6
Average					
2006–2015	2,190,058	1,503,172	96,130	4	6
2010–2015	2,088,386	1,413,520	89,613	4	6

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Starting in 2001, location codes for Resurrection Bay are based on destination rather than location, so harvest, catch, and effort is estimated by “port of return” and a small portion of these estimates may have come from outside the North Gulf Coast Area.

Table 2.—Saltwater sport fishing effort by user group in the North Gulf Coast Management Area, 1996–2015.

Year	Saltwater effort	Charter boat		Private boat		Shore	
		Effort	Percent	Effort	Percent	Effort	Percent
1996	81,499	23,214	28.5	36,156	44.4	22,129	27.2
1997	89,686	24,052	26.8	41,446	46.2	24,188	27.0
1998	71,034	22,409	31.5	32,129	45.2	16,496	23.2
1999	84,637	22,962	27.1	45,143	53.3	16,532	19.5
2000	83,551	27,184	32.5	41,560	49.7	14,807	17.7
2001	91,477	29,573	32.3	44,195	48.3	17,709	19.4
2002	97,351	33,138	34.0	47,074	48.4	17,139	17.6
2003	95,579	37,762	39.5	43,303	45.3	14,514	15.2
2004	117,941	29,943	25.4	71,681	60.8	16,317	13.8
2005	115,605	33,248	28.8	64,007	55.4	18,350	15.9
2006	102,239	30,201	29.5	59,815	58.5	12,223	12.0
2007	119,553	45,913	38.4	59,591	49.8	14,049	11.8
2008	102,635	37,050	36.1	55,834	54.4	9,751	9.5
2009	99,195	36,993	37.3	50,515	50.9	11,687	11.8
2010	85,566	34,714	40.6	42,507	49.7	8,345	9.8
2011	90,152	35,831	39.7	46,594	51.7	7,727	8.6
2012	72,018	32,968	45.8	31,831	44.2	7,219	10.0
2013	94,444	40,714	43.1	44,619	47.2	9,111	9.6
2014	96,164	36,177	37.6	50,417	52.4	9,570	10.0
2015	94,664	39,216	41.4	43,746	46.2	11,702	12.4
Average							
2006–2015	95,663	36,978	39	48,547	51	10,138	11
2010–2015	88,835	36,603	41	43,286	49	8,946	10

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Starting in 2001, location codes for Resurrection Bay are based on destination rather than location, so harvest, catch, and effort is estimated by “port of return” and a small portion of these estimates may have come from outside the North Gulf Coast Area.

Table 3.—Sport fishing effort for salt and fresh waters in the North Gulf Coast Management Area, 1996–2015.

Year	Salt water		Fresh water		All effort
	Effort	Percent	Effort	Percent	
1996	81,235	99.5	376	0.5	81,611
1997	89,622	99.6	389	0.4	90,011
1998	70,845	99.2	567	0.8	71,412
1999	84,467	99.9	105	0.1	84,572
2000	83,395	99.7	253	0.3	83,648
2001	92,016	99.6	367	0.4	92,383
2002	97,988	99.4	558	0.6	98,546
2003	96,596	99.1	924	0.9	97,520
2004	114,338	99.7	360	0.3	114,698
2005	115,605	99.3	761	0.7	116,366
2006	102,565	99.4	667	0.6	103,232
2007	119,656	99.7	383	0.3	120,039
2008	102,737	99.6	461	0.4	103,198
2009	99,416	99.3	726	0.7	100,142
2010	85,566	99.5	424	0.5	85,990
2011	90,152	99.3	660	0.7	90,812
2012	72,018	99.3	518	0.7	72,536
2013	94,444	97.9	2,017	2.1	96,461
2014	96,164	99.2	776	0.8	96,940
2015	94,664	99.3	700	0.7	95,364
Average					
2006–2015	95,738	99.2	733	0.8	96,471
2010–2015	88,835	99.1	849	0.9	89,684

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016).

Note: Estimates for 1996–1999 were recalculated due to error in original, published data analysis.

Table 4.—Sport fishing harvest by species in the North Gulf Coast Management Area, 1996–2015.

Year	Salmon						Dolly Varden	Groundfish			
	Chinook	Coho	Pink	Sockeye	Chum	Total		Lingcod	Rockfish	Halibut	Other ^a
1996	6,247	75,808	4,910	767	1,676	89,408	705	2,815	22,459	25,587	1,646
1997	6,469	87,213	1,571	1,786	745	97,784	494	3,057	22,490	29,706	4,042
1998	3,267	69,146	2,837	1,269	209	76,728	861	2,346	21,873	26,143	9,975
1999	2,640	75,620	4,560	1,064	663	84,547	221	3,445	25,237	27,796	2,060
2000	2,655	70,771	3,883	1,485	1,179	79,973	242	5,565	32,031	30,881	3,269
2001	2,281	96,470	3,840	1,263	650	104,504	216	3,694	32,460	30,511	1,330
2002	3,380	98,559	4,280	3,112	430	109,761	915	4,158	39,833	35,983	2,816
2003	2,792	86,011	4,470	2,077	263	95,613	653	4,209	30,394	42,905	1,859
2004	3,302	107,916	5,603	2,984	1,063	120,868	679	5,066	47,331	56,578	3,214
2005	2,768	135,946	7,051	5,460	1,178	152,403	146	5,451	38,512	53,884	3,471
2006	3,388	82,699	3,452	4,977	715	95,231	194	6,277	38,673	49,068	1,247
2007	3,522	105,970	5,941	5,761	318	121,512	220	9,047	44,384	62,579	2,908
2008	1,834	79,956	6,172	5,732	1,218	94,912	157	9,163	48,917	60,894	657
2009	1,981	91,235	4,399	10,619	580	108,814	165	6,797	46,047	50,604	1,000
2010	2,657	70,555	3,250	4,949	275	81,686	116	7,399	47,214	49,977	599
2011	2,419	88,376	2,401	9,592	438	103,226	170	7,235	46,675	55,682	508
2012	1,461	44,036	6,055	5,593	578	57,723	102	6,780	40,467	43,514	537
2013	2,763	80,938	5,908	6,453	1,491	97,553	175	6,426	51,777	52,997	1,033
2014	2,593	78,197	4,782	5,913	630	92,115	171	5,474	56,748	56,427	117
2015	3,750	90,370	7,514	7,119	993	109,746	148	5,444	59,370	60,688	446
Average											
2006–2015	2,637	81,233	4,987	6,671	724	96,252	162	7,004	48,027	54,243	905
2010–2015	2,607	75,412	4,985	6,603	734	90,342	147	6,460	50,375	53,214	540

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis. Estimates for 1995 are biased but could not be recalculated.

^a Other may include smelt, herring, sablefish, cod, greenling, sculpin, shark, and lingcod (1987–2007).

AREAWIDE OVERVIEW

FISHING EFFORT

From 2010 to 2015, the average estimated angler effort in the NGCMA was 89,613 angler-days, or about 4% of the total statewide sport fishing effort and 6% of the total Southcentral Alaska effort (Table 1). The NGCMA effort in 2012 (72,536 angler-days) was one of the lowest since the 1990s (Figure 2). Effort in 2011 and 2013–2015 was above 90,000 angler-days annually each year. In the NGCMA, most sport fisheries occur in salt water and account for almost all angling effort (99%, Table 3). Since 1990, anglers fishing from boats have composed the largest part of the angler effort (Table 2, Figure 3).

Salmon harvest in the NGCMA has varied since 1996 with a peak harvest of 152,403 salmon occurring in 2005 (Table 4). During 2010–2015 salmon harvest ranged from 57,723 fish in 2012 to 109,746 fish in 2015. Coho salmon annually composed the largest anadromous catch by area anglers, followed by sockeye salmon, pink salmon, Chinook salmon, and chum salmon (Table 4).

Groundfish catch and harvest in the NGCMA varies but has generally increased since 1996 (Table 4). Pacific halibut composed the largest proportion of the groundfish catch, followed by rockfish, and lingcod (Table 4). Current trends indicate an increase in groundfish catch and harvest.

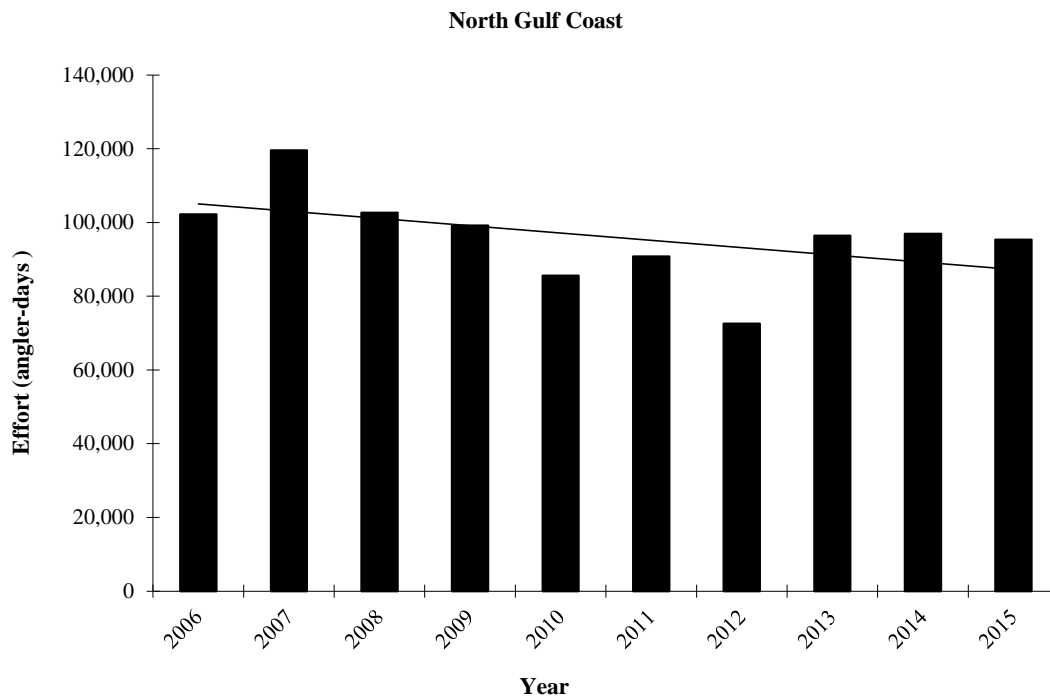


Figure 2.—Sport fishing angler effort (and trend line) expended in the North Gulf Coast Management Area compared to the Alaska statewide effort, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

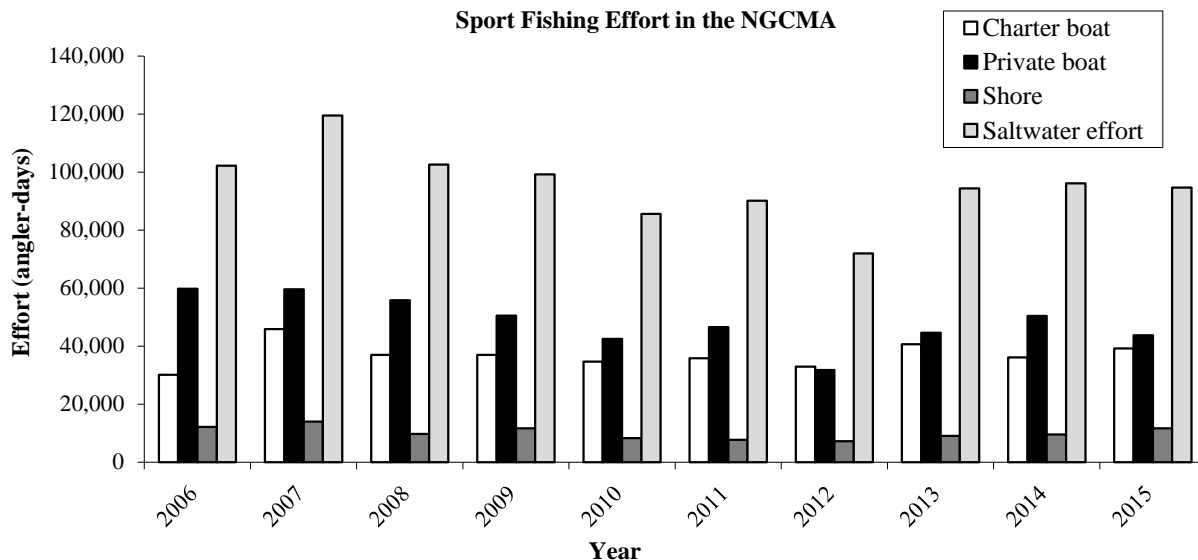


Figure 3.—Saltwater sport fishing effort in the North Gulf Coast Management Area, 2006–2015

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

GUIDE LOGBOOK OVERVIEW

For the most part, angler-days of effort in the guided sport fishing industry in Alaska have remained steady in recent years; however, there are still fish allocation and management decisions that affect the guided sport fishing industry. Logbook data are used to provide information to resolve issues that arise regarding the industry and its effect on fishery resources in many parts of Alaska. The sport fishing guide and business registration and licensing programs were designed to provide a way to comprehensively define this diverse industry throughout Alaska. Guide logbooks collect data on individual guided anglers and include only the guided portion of the total fishing effort, catch, and harvest. The Alaska Statewide Harvest Survey (SWHS) collects data based on a household mail-out survey that includes both guided and unguided anglers to estimate total catch, harvest, and fishing effort.

In 1998, the BOF adopted new statewide sport fishing guide registrations and definitions during their February Statewide Finfish meeting in Girdwood, Alaska (5 AAC 75.075: Sport Fishing Service and Sport Fishing Guide Services; License Requirements; Regulations of Activity). This was a registration process and not a licensing process. On May 11, 2004, the Alaska Legislature adopted House Bill 452 (HB 452), which established statewide licensing requirements for sport fishing guide business owners and sport fishing guides. This bill was created to establish minimum professional standards for fishing guides before they could obtain a license in order to protect consumers and promote professionalism in the sport fishing guide industry. During the 2014 legislative session, the sport fishing guide licensing program was allowed to sunset; however, the BOF adopted regulations to continue the program as a registration program with a logbook reporting requirement (5 AAC 75.075–077). In February 1998, BOF adopted regulations (5 AAC 75.076) requiring logbooks for saltwater charter vessels statewide. A

complete history of this and detailed charter logbook information from 2014 can be found in Sigurdsson and Powers (2009).

The saltwater charter industry at the Port of Seward has declined since 2006 and 2007 when there were around 100 licensed charter businesses, approximately 140 registered charter vessels, and a little over 42,000 charter angler-days per year (Sigurdsson and Powers 2009). In 2015, there were only 54 registered businesses, 96 registered vessels, and 38,472 angler-days reported for the Port of Seward (Saltwater Logbook Database, 2nd edition. Alaska Department of Fish and Game, Division of Sport Fish. 2006 to present. [Accessed October 7, 2016]. [URL not publicly available as some information is confidential. Contact Research and Technical Services for data requests.]). Most of these charter vessels participate in both groundfish and salmon fisheries. This makes Seward the second highest in number of charter businesses in Southcentral Alaska, behind the port of Homer and the fourth highest in the state, behind Sitka and Ketchikan (Powers and Sigurdsson 2016).

STOCKED FISHERIES

ARCTIC GRAYLING AND RAINBOW TROUT

Fishery Description

In the late 1990s, ADF&G began a trout stocking program to increase sport fishing opportunities within the NGCMA (Tables 5 and 6). There are only a few systems that support natural rainbow trout fisheries and none for Arctic grayling in the NGCMA. These fish have been stocked in lakes near Seward to diversify opportunities for sport anglers (Table 6). Lost Lake was stocked in 1999 and 2001 with an approximate total of 67,800 diploid fingerling rainbow trout. No recent stocking of Lost Lake has occurred. First Lake, located in Seward's Two Lakes Park, is stocked annually with either catchable-sized rainbow trout or Arctic grayling. Seward's First Lake was last stocked with Arctic grayling in 2011. Since 2011, the Arctic grayling stocking program was discontinued as a cost-reduction measure. From 2010 to 2015, an average of 659 catchable rainbow trout were stocked annually (Table 6). Rainbow trout stocking provides opportunities for local youth and supports a Youth-Only Fishery sponsored by the Seward Advisory Committee and local businesses.

Fishery Management and Objectives

The management goal for the NGCMA stocking program is to provide sport fishing opportunity through annual or alternate-year stocking of lakes with catchable-sized rainbow trout. The ADF&G Statewide Stocking Plan for Recreational Fisheries is updated annually and available for public comment. The stocking plan can be found online at <http://www.adfg.alaska.gov/index.cfm?adfg=fishingSportStockingHatcheries.stockingPlan>.

Table 5.—Hatchery releases of coho and Chinook salmon by location and year for the North Gulf Coast Management Area, 1998–2015.

Year	Coho salmon							Chinook salmon		
	Fry	Smolt						Smolt		
	Bear Lake	Bear Creek	Bear Lake	Lowell Creek	Seward Lagoon	Seward SeaLife	Total	Lowell Creek	Seward Lagoon	Seward SeaLife
1998	409,000	177,000		65,687	74,365		317,052	101,992	205,133	
1999	306,000	51,000		62,580	109,142		222,722	85,502	88,066	
2000	316,000	102,000		54,184	145,693		301,877	109,461	212,873	
2001	310,000	121,000		125,618	124,703		371,321	114,748	113,147	
2002	404,700	123,800		119,512	121,743		365,055	93,296	100,314	
2003	404,800		253,400	124,225	123,718		501,343	110,331	109,976	
2004	406,000	285,000		131,989	131,798	192,000	740,787	89,388	109,600	30,066
2005	400,500		488,200	132,276	132,229		752,705	100,088	114,847	96,702
2006	447,300		115,300	131,261	131,326	146,100	523,987		226,621	76,596
2007	521,000		237,000	130,862	132,811		500,673			117,842
2008	360,000		142,000		233,365		375,365			142,469
2009	270,000		68,000	91,833	91,979		251,812			
2010	435,000			133,947	134,008		267,955	109,779	110,671	
2011	437,000				255,252		255,252		223,881	
2012	222,000	93,000			249,309		342,309		219,743	
2013	405,000				216,444		216,444		141,550	
2014	468,000	55,000			97,675		152,675		183,464	
2015	448,000	98,000			279,546		377,546		298,542	

Source: Marianne McNair, ADF&G, CFMD, Juneau; Tom Prochazka and Mark Thomas, CIAA, Trail Lakes Hatchery; ADF&G, Division of Sport Fish stocking records.

Note: These numbers are included in the yearly totals for Table 6.

Table 6.—Hatchery releases of sockeye salmon, rainbow trout, Arctic grayling by location and year, and total number released including both Tables 5 and 6 by year for the North Gulf Coast Management Area, 1998–2015.

Year	Sockeye salmon						Rainbow trout		Arctic grayling	Total ^a
	Fry	Fingerling	Smolt and presmolt				Catchables	Fingerling	Catchables	
	Bear Lake	Bear Lake	Bear Lake	Bear Creek	Grouse Lake	Saltwater release	First Lake	Lost Lake	First Lake	
1998	265,000		506,703		1,514,000					3,318,880
1999	1,380,000							42,802		2,125,092
2000	1,796,000	223,000					1,000			2,960,211
2001	145,000						1,000	25,000		1,080,216
2002	2,407,700		802,600				1,007			4,174,672
2003	1,467,000		334,000				1,427			2,928,877
2004	2,406,000		603,000				955			4,385,796
2005	2,416,000		1,006,000				760			4,887,602
2006	2,413,900			979,000			405			4,667,809
2007	2,437,000		619,000						478	4,195,993
2008	2,400,000					1,600,000			981	4,878,815
2009	2,543,000					1,675,000				4,739,812
2010	2,200,000					1,650,000	150			5,041,510
2011	2,488,000					0	75		909	3,660,369
2012	2,490,000					1,305,000	1,132			4,922,493
2013	2,548,000					2,090,000	1,054			5,618,492
2014	2,405,000					1,742,000	1,029			5,104,843
2015	2,415,000					1,758,000	512			5,675,146

Source: Marianne McNair, ADF&G, CFMD, Juneau; Tom Prochazka and Mark Thomas, CIAA, Trail Lakes Hatchery; ADF&G, Division of Sport Fish stocking records.

^a Totals for each year include stockings from Table 5.

SALMON

Fishery Description

ADF&G began stocking salmon in the NGCMA beginning in the 1960s. The stocking of hatchery fish has increased and diversified the opportunities available to sport anglers in the NGCMA, especially for Resurrection Bay saltwater anglers. Total hatchery releases of salmon in the NGCMA have averaged just over 5.0 million fish per year over the last 6 years (calculated from Tables 5 and 6). These stocking activities consist of 2 types of programs: large private nonprofit hatchery releases to enhance fish abundance for both commercial and sport fisheries, and smaller ADF&G hatchery releases targeted at enhancing sport fisheries. All hatchery salmon releases contribute to the common property of all fisheries.

Programs directed toward enhancing sport fisheries include the stocking of coho and Chinook salmon smolt by state-operated hatcheries and the release of coho salmon raised by Cook Inlet Aquaculture Association (CIAA). CIAA also releases sockeye salmon into Resurrection Bay fresh and salt waters primarily intended for commercial harvest. Over 2 million sockeye salmon fry have been released at Bear Lake annually since 2010, and except for 2011, over 1.3 million sockeye salmon smolt have been released annually into salt water (Table 6). To benefit sport anglers, over 400,000 coho salmon fry have been released into Bear Lake annually since 2010 (except about 220,000 in 2012). In addition, ADF&G has stocked on average 205,372 (range: 97,675–279,546) coho salmon smolt into Seward Lagoon, annually since 2010.

Fishery Management and Objectives

The coho and Chinook salmon stocking program in Seward is designed to create additional saltwater and shoreline fishing opportunities and draw anglers to fish hatchery stocks.

The Alaska Board of Fisheries has established 3 salmon management plans for North Gulf Coast and Resurrection Bay. These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers (Appendix A1). Management plans and policies established for Resurrection Bay include the following:

1. Trail Lakes Hatchery Salmon Hatchery Management Plan 5 AAC 21.373. This management plan establishes guidelines for the enhancement of coho and sockeye salmon in Bear Lake near Seward. In essence, the plan provides for the enhancement of sockeye salmon in Bear Lake intended for commercial use in Resurrection Bay, provided the enhancement does not negatively impact coho salmon smolt production from Bear Lake. Surplus sockeye are split 50:50—50% to CIAA cost recovery and 50% to the commercial fishing fleet.
2. Resurrection Bay Salmon Management Plan 5 AAC 21.376. This management plan provides allocation and management guidelines for Resurrection Bay salmon fisheries. The plan stipulates that coho and Chinook salmon fisheries of Resurrection Bay be managed primarily for recreational (sport fishery) uses and provides for a commercial fishery for other salmon species only if the prosecution of these fisheries does not interfere with the sport fishery in Resurrection Bay.
3. North Gulf Coast King Salmon Sport Fishery Management Plan 5 AAC 58.065. This management plan directs Chinook salmon fishery effort to hatchery stocks and stabilizes the sport harvest of Chinook salmon in the North Gulf Coast.

CHINOOK SALMON FISHERIES

FISHERY DESCRIPTION

There is little wild production of Chinook salmon in NGCMA waters; therefore, the Chinook salmon sport fishery in NGCMA is supported almost entirely by hatchery-produced fish. Resurrection Bay is the only location in NGCMA waters that is stocked with Chinook salmon, and in the past, stocking by hatchery enhancement had created 2 distinct Chinook salmon runs. The late run Chinook salmon program was canceled in 1998 due to lack of available broodstock. Currently, hatchery Chinook salmon return to release sites as mature adults from late May through mid-July. Marine anglers harvest Chinook salmon feeding in the area throughout the year, with winter months being the most productive. In 2007, an annual youth-only Chinook salmon sport fishery was approved by the BOF and now occurs in the Seward lagoon and outflow stream the third weekend of June and the second weekend in July.

FISHERY MANAGEMENT AND OBJECTIVES

The Alaska Board of Fisheries has established management plans for North Gulf Coast and Resurrection Bay salmon (Appendix A1). These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers.

No formal escapement goals have been established for Chinook salmon returns in the North Gulf Coast; however, the purpose of the Chinook salmon enhancement program is to provide sport fishing opportunities in Resurrection Bay. The management objectives of the hatchery enhancement program are as follows: 1) produce a return of 4,000-6,000 early-run adult Chinook salmon to Resurrection Bay, and 2) generate 10,000 angler-days of annual sport fishing effort directed at stocked Chinook salmon in Resurrection Bay (Statewide Stocking Plan for Sport Fisheries (<http://www.adfg.alaska.gov/index.cfm?adfg=fishingsportstockinghatcheries.stockingplan> accessed October 2016)).

STOCKING PROGRAM

The current ADF&G statewide stocking plan sets a stocking target of 215,000 Chinook salmon smolt for Seward Lagoon, Resurrection Bay. The primary Chinook salmon broodstock source is Crooked Creek, and if the number of spawning pairs from the primary brood source is inadequate, the secondary broodstock source is Ship Creek. The amount of Chinook salmon stocked into Resurrection Bay has varied in the past although since the new William Jack Hernandez Sport Fish Hatchery (WJHSFH) became operational in 2011, stocking size has become more reliable. The WJHSFH has the ability to raise larger smolt in 1 year versus the 2 years it would have taken in the colder waters at the former Fort Richardson Sport Fish Hatchery. The Chinook salmon smolt released in 2010 and 2011 were raised in the Fort Richardson Sport Fish Hatchery. In 2010, a total of 220,405 (11.0 g) Chinook salmon smolt were released at 2 release locations: Lowell Creek (109,779 smolt) and Seward Lagoon (110,671 smolt). The last stocking at Lowell Creek was in 2010 because this site is no longer considered a suitable stocking location. Until a suitable location can be determined, all future stockings of Chinook salmon in Resurrection Bay will be combined and will occur only at the Seward Lagoon location. In 2012–2015 all Chinook smolt were raised in the WJHSFH Hatchery and the number of Chinook salmon smolt released into the Seward Lagoon ranged from 141,550 fish in

2013 to 298,542 in 2015 (Table 5) and each fish averaged 15.2 g. The number of Chinook salmon smolt released each year varies depending on the success and availability of broodstock for the corresponding brood year.

FISHERY PERFORMANCE

The average estimated annual catch of Chinook salmon in the NGCMA for 2010–2015 was 4,396 (Table 7), varying between a low of 2,638 in 2012 and a high of 5,612 in 2015. The annual catch of Chinook salmon has increased since 2012 (Figure 4). The average estimated harvest from 2010 to 2015 was 2,607 fish. Anglers harvested 59% of their Chinook salmon catch on average during this period of time (2010–2015), which was slightly higher than the 10-year average (58%).

The 2012 sport fishing season had the lowest catch and harvest of Chinook salmon since the early 1990s. In 2012, Chinook salmon fisheries across Alaska saw a similar decrease, and a Chinook Salmon Symposium was held in October of 2012 to address concerns regarding the lack of returning fish (ADF&G Chinook Salmon Research Team 2013). The amount of time that a Chinook salmon typically spends feeding in marine waters can vary from 3 to 6 years, so it is difficult to associate one particular stocking event or year class with the weak runs in 2012. The average catch during 2013–2015 was 4,890 Chinook salmon, which was between 1.5 and 2 times the catch in 2012. In 2015, the annual catch (5,612 fish) was the highest since the mid-2000s.

From 2010 through 2015, 94% of harvested Chinook salmon were caught by boat anglers versus shore anglers. From 2010 to 2015, average annual catch by anglers on charter boats (2,270 fish) was higher than for anglers using private boats (1,848 fish). This relationship was reversed in 2013; slightly more Chinook salmon were caught by anglers fishing from private boats (2,432 fish) than anglers using a charter operator (2,344 fish). The reason for the slight increase in private boat catch in 2013 is unknown and could be related to factors affecting effort or for economic reasons. Shore anglers have had less annual catch than boat anglers since the late 1990s. This could be because of less effort by the shore anglers targeting Chinook salmon or because Chinook salmon are more accessible for boat anglers. It also might be a result of boat anglers targeting other salmon species and incidentally catching Chinook salmon. According to the ADF&G Saltwater Logbook Database (2006–present), which contains only data from charter boats, between 2010 and 2014, an average of 16,752 angler-days were spent annually catching salmon in the NGCMA. Most charter trips in the NGCMA are taken by nonresident anglers targeting multiple species.

Table 7.—Chinook salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Boat						Shore		Total	
	Charter		Private		Total					
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	1,330	807	1,354	1,172	2,684	1,979	4,972	4,268	7,656	6,247
1997	1,175	573	3,220	2,156	4,395	2,729	4,924	3,740	9,319	6,469
1998	729	263	1,421	880	2,150	1,143	2,447	2,124	4,597	3,267
1999	594	303	1,185	779	1,779	1,082	2,432	1,558	4,211	2,640
2000	854	717	1,478	717	2,332	1,434	1,565	1,221	3,897	2,655
2001	907	572	1,278	870	2,185	1,442	1,093	839	3,278	2,281
2002	1,509	982	1,853	1,247	3,362	2,229	1,503	1,151	4,865	3,380
2003	1,581	862	2,025	1,186	3,606	2,048	854	744	4,460	2,792
2004	1,402	865	3,611	1,744	5,013	2,609	841	693	5,854	3,302
2005	3,142	1,179	2,864	1,151	6,006	2,330	484	438	6,490	2,768
2006	1,924	1,064	3,866	1,999	5,790	3,063	370	325	6,160	3,388
2007	2,703	1,366	2,191	1,576	4,894	2,942	645	580	5,539	3,522
2008	1,667	793	1,473	731	3,140	1,524	362	310	3,502	1,834
2009	1,597	910	2,106	1,045	3,703	1,955	26	26	3,729	1,981
2010	2,454	1,209	2,237	1,320	4,691	2,529	460	128	5,151	2,657
2011	2,052	1,165	1,784	1,172	3,836	2,337	82	82	3,918	2,419
2012	1,502	966	1,109	482	2,611	1,448	27	13	2,638	1,461
2013	2,344	1,473	2,432	1,182	4,776	2,655	129	108	4,905	2,763
2014	1,988	1,368	1,733	910	3,721	2,278	433	315	4,154	2,593
2015	3,282	2,283	1,792	1,034	5,074	3,317	538	433	5,612	3,750
Average										
2006–2015	2,151	1,260	2,072	1,145	4,224	2,405	307	232	4,531	2,637
2010–2015	2,270	1,411	1,848	1,017	4,118	2,427	278	180	4,396	2,607

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis.

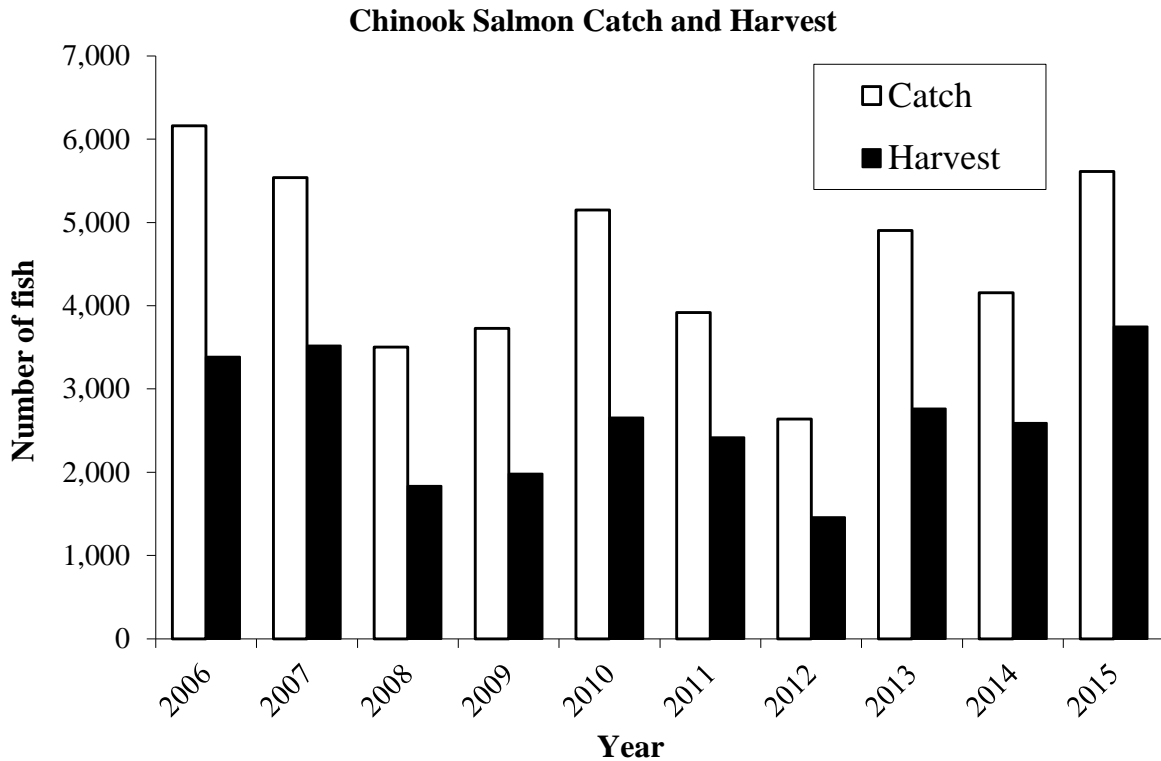


Figure 4.—Chinook salmon catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

COHO SALMON FISHERIES

FISHERY DESCRIPTION

The North Gulf Coast and Resurrection Bay annually supports one of the largest marine coho salmon sport fisheries in Alaska. The coho salmon sport fishery has grown substantially since the 1990s and is one of the most popular sport fisheries in NGCMA. Natural bathymetric features such as Aialik Peninsula and the Chiswell Ridge combined with coastal ocean currents and upwelling result in an area rich in primary production that attracts great numbers of feeding coho salmon. This fishery starts in late June to early July as anglers target wild and hatchery coho salmon feeding just outside of Resurrection Bay. This fishery culminates with the Seward Silver Salmon Derby held each August since 1956, a shoreline fishery over Labor Day weekend, and an annual youth-only fishery that occurs the last weekend of August and first weekend in September.

FISHERY MANAGEMENT AND OBJECTIVES

The Alaska Board of Fisheries has established management plans for North Gulf Coast and Resurrection Bay salmon (Appendix A1). These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers.

The purpose of the coho salmon enhancement program is to increase coho salmon sport fishing opportunities in Resurrection Bay while maintaining the natural production of Resurrection Bay drainages. The management objectives are as follows: 1) produce a return of 20,000 adult coho salmon to Resurrection Bay, and 2) generate 25,000 angler-days of annual sport fishing effort directed at stocked coho salmon in Resurrection Bay. Although no formal escapement goals have been established for coho salmon runs in Resurrection Bay, CIAA allows a minimum of 300 coho salmon into Bear Lake. A weir on Bear Creek is used to collect coho salmon eggs for ADF&G and CIAA stocking activities.

Annual foot stream surveys are used to assess the success of coho salmon returns to Resurrection Bay drainages (Figure 5). These surveys were performed in selected Resurrection Bay streams on coho salmon starting in 1960 (Dunn 1961) and were discontinued after 1989 (Carlson and Vincent-Lang 1990b) due to budget constraints. There are currently 27 years of historical data that provide a relative abundance index for streams in Resurrection Bay (Tables 8 and 9). Information about stream survey reach was not detailed in previous survey reports (Dunn 1961; Logan 1962-1969; McHenry 1970-1986; Sonnichsen et al. 1987; Vincent-Lang et al. 1988; Carlson and Vincent-Lang 1990b), which made it difficult to know if the survey area reaches were consistent when resumed in 2013. However, historical stream survey reach information was relayed from personal communications in 2013 between Dan Bosch, Area Management coordinator, and Tom Prochazka, who was a Fish and Wildlife Technician III in Seward from 1981 through 1991 and who participated in the surveys. In 2013, stream surveys in Resurrection Bay resumed annually; however, the success of these surveys was limited in 2013 due to high water and the ability to survey only 5 of the 9 streams (Table 9). In 2014 and 2015, all of the historical sites were surveyed; however, comparisons with historical surveys are questionable. It is difficult to compare historical survey numbers with recent years because the exact survey reach of the historical surveys are unknown. Resurrection River tributaries are subject to flooding and channel variation allowing for variation in the survey from one year to the next.

STOCKING PROGRAM

Resurrection Bay drainages produce large numbers of coho salmon and support one of the largest saltwater coho salmon sport fisheries in the state (Brazil and Bosch 2016). However, natural production varies on an annual basis due to highly variable stream flows and water temperature fluctuations in this coastal region. Hatchery supplementation of natural production in Resurrection Bay is necessary to meet the demands of this sport fishery. Through a cooperative agreement with ADF&G, Cook Inlet Aquaculture Association (CIAA) releases fry and smolt into Bear Lake and Bear Creek and operates the weir on Bear Creek. The Resurrection Bay coho salmon enhancement program was initiated in 1964 at Bear Lake to supplement the production of wild stocks. From 2010 through 2015, the ADF&G and CIAA hatcheries, stocked a combined average of 268,697 coho salmon smolt and 402,000 coho salmon fry (Table 5).

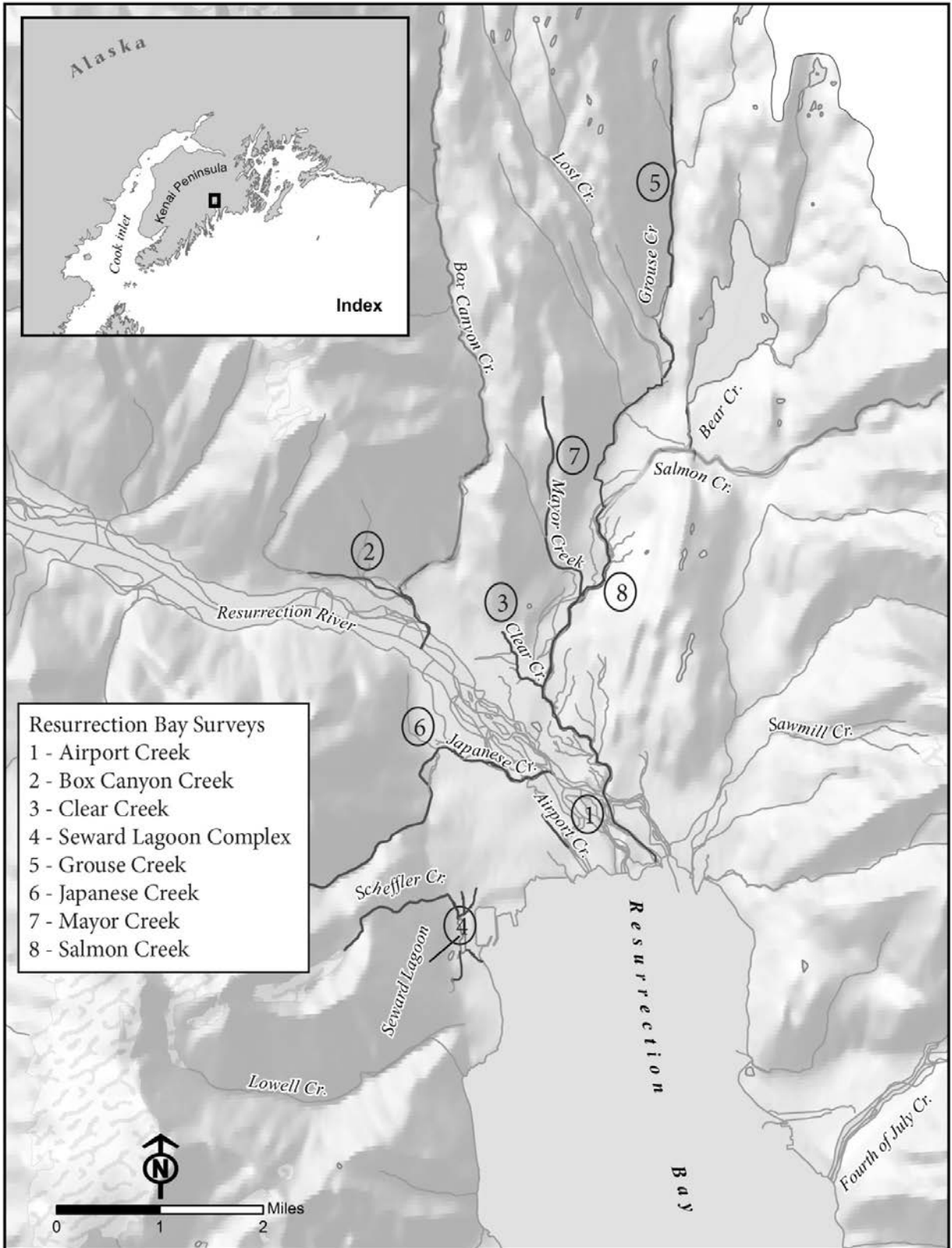


Figure 5.—Coho salmon stream survey locations in the North Gulf Coast Management Area, 2013–2015.

Table 8.—Historical North Gulf Coast Management Area coho salmon escapement index streams survey data, 1965–1988.

Year	Airport Creek	Lower Bear Creek	Box Canyon Creek	Clear Creek	Dairy Creek	Grouse Creek	Japanese Creek	Mayor Creek	Salmon Creek	Total
1965	50			56	48	106	86	16	174	536
1966	127			171	30	236	228	135	234	1161
1967	55			227	99	174	172	66	329	1122
1968	67			364	98	378	229	41	1037	2214
1969 ^a	36		54	59	115	182	78	64	19	607
1970	26		19	91	44	132	79	38	105	534
1971	13		56	93	46	150	79	19		456
1972	15		59	55	49	42	68	22		310
1973	4		36	37	63	34	40	4		218
1974	23		28	60	114	64	77	51		417
1975	2		8	15	32	12	31	5		105
1976	24		45	89	17	27	94	46		342
1977	7		45	37	134	187	62	42		514
1978	14		28	59	146	360	51	50		708
1979	1		121	42	68	14	61	30		337
1980	9		32	88	122	108	49	94		502
1981 ^b										
1982	0		248	241	108	307	328	145		1377
1983	0		154	62	64	408	85	69		842
1984	0		144	140	251	396	121	138		1190
1985	0		112	190	168	336	120	98		1024
1986		71	119	115	225 ^c	977	131	537		2175
1987		24	1158		602					1784
1988		18	36	121	228	158	229	72		1784

Source: Dunn (1961), Logan 1962-1969), McHenry 1970-1986), Sonnichsen et al. (1987), Vincent-Lang et al. (1988), Carlon and Vincent-Lang (1990b).

^a In 1969, Box Canyon Creek was added as a survey site.

^b In 1981, not enough data were collected to determine minimum escapement.

^c In 1986, Dairy Creek became the Seward Lagoon system, which includes Dairy Creek, Pasture Creek, Railroad Creek, and First Lake Creek; Lower Bear Creek was also added in 1986.

Table 9.—Coho salmon escapement index streams surveyed in the North Gulf Coast Management Area, 2013–2015.

Year	Airport Slough	Box Canyon Creek	Clear Creek	Grouse Creek	Japanese Creek	Mayor Creek	Salmon Creek	Scheffler Complex	Total
2013 ^a		176	157	48		228		228	837
2014	246	43	122	18	29	16	378	5	857
2015	0	6	141	99	23	42	185 ^b	90	586

^a 2013 surveyors experienced high water events and difficulty completing surveys.

^b 2015 Salmon Creek survey was incomplete.

Coho salmon enhancement in Resurrection Bay began in 1969 by ADF&G with hatchery-reared smolt at several local release sites (Table 5) and with many different brood sources (Table 10). In 2010, smolt were stocked at both Lowell Creek and the Seward Lagoon stocking sites; however, like that of Chinook salmon, 2010 was the last year that coho salmon were stocked into Lowell Creek because it was no longer a suitable stocking location. Until a suitable location can be determined, all future stockings of coho salmon smolt by ADF&G for Resurrection Bay will be combined and will occur at the Seward Lagoon location. The current ADF&G statewide stocking plan has a stocking target of 240,000 coho salmon smolt into Seward Lagoon, Resurrection Bay. Since the late 1990s, the brood source for stocked coho salmon has been the Bear Lake stock. The stocking size for coho salmon smolt in Resurrection Bay has varied in the past; however, since the new WJHSFH became operational in 2011, stocking size has become more reliable than in previous years. The coho salmon smolt raised at the former Fort Richardson Sport Fish Hatchery and released into Seward Lagoon in 2010, 2011, and 2012 averaged 18.0 g. The smolt released between 2013 and 2015 were raised at the WJHSFH and averaged 22.7 g.

Table 10.—Origin of broodstock for coho salmon stocked in Resurrection Bay tributaries, 1965–2015.

State of origin	Broodstock	Brood year
AK	Swanson River	1965–1966
OR	Big Creek	1966
AK	Rose Tead Lake	1966, 1972
OR	Eagle Creek	1967
AK	Bear Creek	1968–1969, 1972, 1974, 1980–2015
AK	Miam Lake	1970
AK	Seward Lagoon	1971, 1973, 1975–1977, 1978–1980
AK	Ship Creek	1971, 1975, 1985
AK	Grouse Lake	1979
AK	Crooked Creek	1985–1986
AK	Ward Lake	1990
AK	Little Su	1998

Source: ADF&G Hatchery Program Database., Alaska Department of Fish and Game, 1965 to present. (Accessed October 6, 2016.) URL not publicly available. Contact PNP hatchery program for data requests.

Currently the CIAA Trail Lakes Hatchery stocks approximately 450,000 coho salmon fingerling into Bear Lake, and when funds and fish are available, an additional 100,000 smolt are released into Bear Creek as well. CIAA stocked an average (2010–2015) 402,500 (1.2 g) coho salmon fry in Bear Lake. CIAA also stocked an additional 82,000 (13.0 g) smolt into Bear Creek for 2012, 2014, and 2015 (12.3 g, 12.3 g, and 14.5 g, respectively).

In Resurrection Bay, hatchery fish contribute up to 51% of the fish available to the sport fishery (Vincent-Lang 1987; Vincent-Lang et al. 1988; Carlon and Vincent-Lang 1989, 1990a). A 2003–2005 coho salmon study (Bosch 2011) showed that stocking by ADF&G at Seward Lagoon and Lowell Creek sites provide as much as 80% of the coho salmon harvested from the Seward beach fishery during late August and September. Coho salmon released from hatcheries in Cook Inlet, Resurrection Bay, and Prince William Sound are all harvested by sport anglers fishing out of Seward (Bosch 2011). The hatchery contribution of coho salmon harvested by anglers in Resurrection Bay was 33% in 2003, 24% in 2004, and 33% in 2005.

FISHERY PERFORMANCE

The average annual catch of coho salmon in the NGCMA for 2010–2015 was an estimated 87,433 fish and ranged from 51,811 fish in 2012 to 110,527 fish in 2011 (Figure 6). The average harvest during this time was 86% (75,412 fish) of the catch (Table 11).

During 2010 and 2011, NGCMA averaged annual catches of 96,881 coho salmon and 82% was harvested on average. These years were similar to the 10-year (2006–2015) average. In 2012, NGCMA had one of the lowest annual catches (51,811 fish) since the mid-1990s; both boat and shore anglers had low catches (Figure 7). The 2012 catch was about 54% below the 10-year average. The amount of time that coho salmon spend in freshwater as juveniles can vary, but upon leaving freshwater as smolt, coho salmon spend approximately 1 year in the ocean before returning to the location where they imprinted (Sandercock 1991). In mid-July of 2011, Fort Richardson Sport Fish Hatchery released an estimated 255,252 (18.1 g) smolt into Seward Lagoon. Smolt size and release numbers in 2011 were similar to previous years so poor ocean survival in smolt released in 2011 probably influenced the weak returns of 2012. In 2013 through 2015, catch numbers averaged 93,008 fish, which was slightly below the 10-year average (95,494 fish).

Catch of coho salmon by shore anglers has been low; however, in 2011, the annual catch by shore anglers was unusually low (815 fish), making up only 1% of the overall catch and the lowest ever observed.

Overall, as long as hatcheries are able to continue stocking good, healthy numbers of coho salmon and ocean conditions continue to be favorable, catches should continue to be good in the NGCMA.

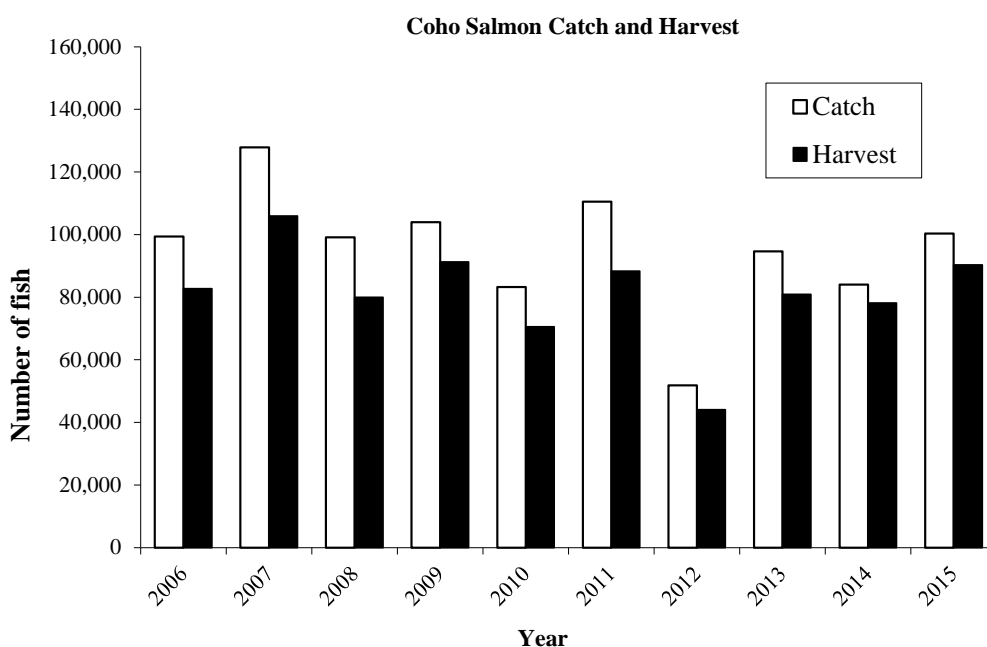


Figure 6.—Coho salmon catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Table 11.—Coho salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Boat									
	Charter		Private		Total		Shore		Total	
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	24,093	18,696	51,346	41,898	75,439	60,594	19,217	15,214	94,656	75,808
1997	30,300	24,010	75,463	50,188	105,763	74,198	16,771	13,015	122,534	87,213
1998	19,501	16,288	63,145	42,552	82,646	58,840	11,537	10,306	94,183	69,146
1999	29,891	24,053	54,169	44,500	84,060	68,553	8,628	7,067	92,688	75,620
2000	25,706	22,708	47,222	42,079	72,928	64,787	7,186	5,984	80,114	70,771
2001	41,739	36,873	53,011	45,990	94,750	82,863	15,969	13,607	110,719	96,470
2002	38,944	34,018	62,642	54,811	101,586	88,829	10,486	9,730	112,072	98,559
2003	26,697	22,834	69,385	54,401	96,082	77,235	11,275	8,776	107,357	86,011
2004	40,552	32,599	88,060	69,087	128,612	101,686	8,318	6,230	136,930	107,916
2005	50,211	43,371	107,126	81,440	157,337	124,811	13,399	11,135	170,736	135,946
2006	27,541	24,700	66,789	53,291	94,330	77,991	5,063	4,708	99,393	82,699
2007	50,314	43,547	74,566	60,177	124,880	103,724	2,971	2,246	127,851	105,970
2008	33,525	32,032	63,455	46,190	96,980	78,222	2,130	1,734	99,110	79,956
2009	44,718	39,814	57,065	49,722	101,783	89,536	2,210	1,699	103,993	91,235
2010	32,596	29,328	48,024	38,953	80,620	68,281	2,614	2,274	83,234	70,555
2011	43,394	37,735	66,318	49,928	109,712	87,663	815	713	110,527	88,376
2012	20,163	17,605	30,326	25,401	50,489	43,006	1,322	1,030	51,811	44,036
2013	42,743	36,639	50,421	43,059	93,164	79,698	1,499	1,240	94,663	80,938
2014	29,625	28,071	48,587	44,797	78,212	72,868	5,777	5,329	83,989	78,197
2015	47,266	43,197	48,883	44,854	96,149	88,051	4,222	2,319	100,371	90,370
Average										
2006–2015	37,189	33,267	55,443	45,637	92,632	78,904	2,862	2,329	95,494	81,233
2010–2015	35,965	32,096	48,760	41,165	84,724	73,261	2,708	2,151	87,433	75,412

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis.

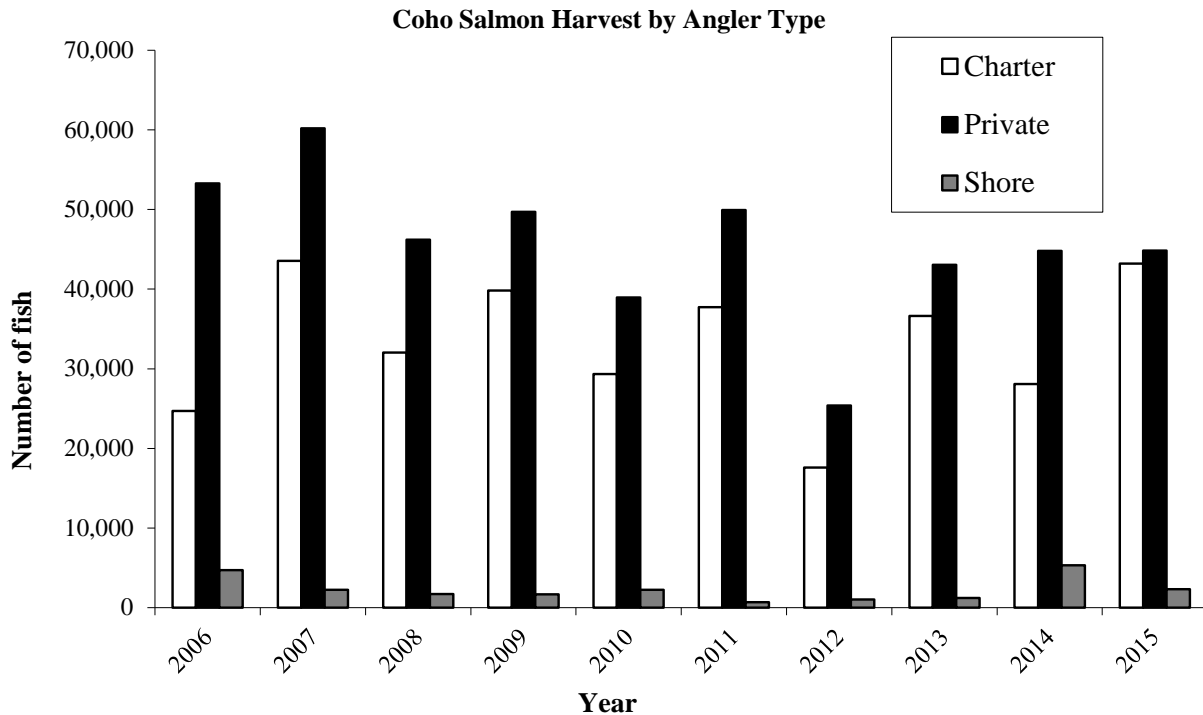


Figure 7.—Coho salmon harvest by user groups (anglers in charter boats, private boats, and from the shore), North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

SOCKEYE SALMON FISHERY

FISHERY DESCRIPTION

Sockeye salmon return to NGCMA streams from late May through July and spawn from mid-July through September. The majority of the sockeye salmon fishery in the NGCMA takes place at the mouth of the Resurrection River and targets hatchery stocks returning to Bear Lake. Smaller sockeye salmon fisheries occur on wild stocks throughout the management area and are accessible only by boat or air. A popular fishery occurs at Little Johnstone Bay and charter operators fly clients in from as far away as Anchorage and Soldotna. These small fisheries generally do not receive enough responses in the SWHS to accurately estimate effort or harvest.

FISHERY MANAGEMENT AND OBJECTIVES

The Alaska Board of Fisheries has established management plans for North Gulf Coast and Resurrection Bay salmon (Appendix A1). These plans provide for the sustained yield of area fisheries, as well as establishing allocation and management guidelines for ADF&G managers.

The CIAA broodstock requirements are approximately 2,460 sockeye salmon.

STOCKING PROGRAM

ADF&G does not have a sockeye salmon stocking program in North Gulf Coast waters. Cook Inlet Aquaculture Association operates the Trail Lake Hatchery and a weir at Bear Lake under a

cooperative agreement with ADF&G. The original sockeye salmon broodstock came from Big River Lakes in West Cook Inlet, or Upper Russian Lake on the Kenai Peninsula. Since 1993, all sockeye salmon broodstock has been obtained from fish returning to Bear Lake. Bear Lake broodstock is allowed to enter the lake and mature under natural conditions, and then collected at spawning areas in the lake. This method of collection was found to minimize broodstock mortality. Bear Lake has a desired escapement range of 5,600 to 13,200 sockeye salmon for broodstock and natural spawning requirements (Hammarstrom and Ford 2009). This goal has been achieved every year since 1994 (Hammarstrom and Ford 2009).

From 2010 through 2015, CIAA stocked on average 2.4 million sockeye salmon fry into Bear Lake and 1.4 million smolt into salt water (Table 6). The CIAA egg-take goal for Bear Lake sockeye salmon is 6 million eggs. In 2011, due to an infectious haematopoietic necrosis (IHN) outbreak, no smolt were released into Bear Lake (Cherry 2012).

FISHERY PERFORMANCE

The average annual catch of sockeye salmon in the NGCMA for 2010–2015 was 7,636 fish with an average harvest rate of 86% (6,603 fish; Table 12, Figure 8). The 2011 sockeye salmon catch (10,758 fish) and harvest (9,952 fish) were the second highest documented in the last 25 years (Figure 8). From 2010 to 2015, shore anglers caught more sockeye salmon than boat anglers (60% of the total); however, in 2013, shore anglers only caught 43% of the total catch.

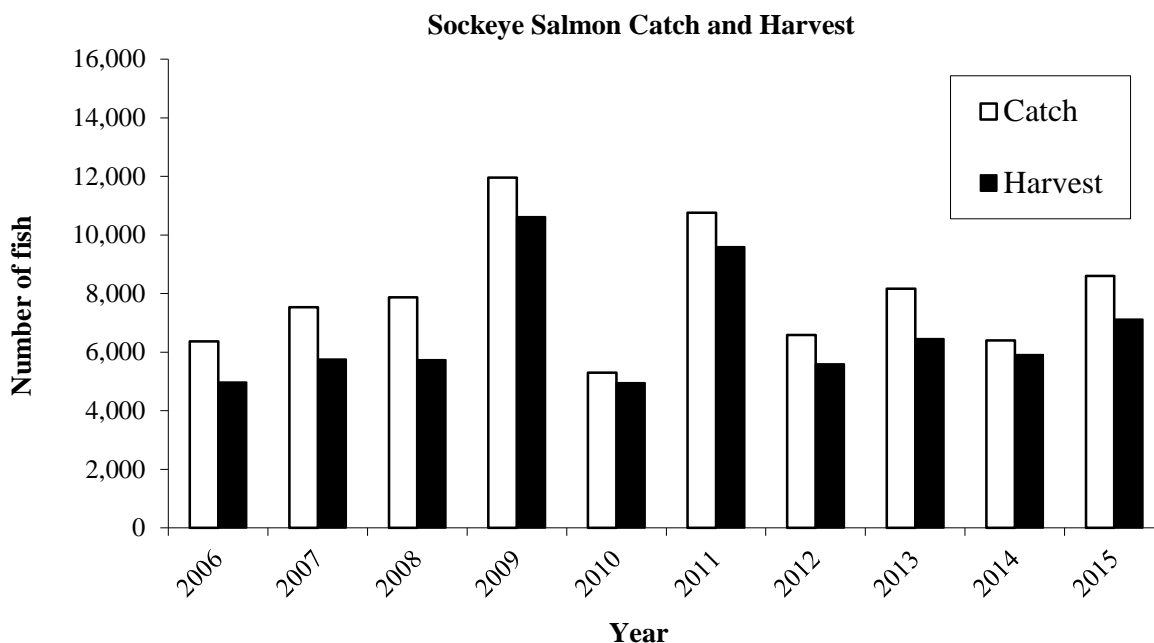


Figure 8.—Sockeye salmon catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Table 12.—Sockeye salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Boat						Shore		Total	
	Charter		Private		Total					
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	409	161	507	325	916	486	491	281	1,407	767
1997	458	76	636	493	1,094	569	1,447	1,217	2,541	1,786
1998	516	431	591	439	1,107	870	716	399	1,823	1,269
1999	151	108	719	697	870	805	280	259	1,150	1,064
2000	460	331	1,609	477	2,069	808	712	677	2,781	1,485
2001	1,046	705	534	293	1,580	998	374	265	1,954	1,263
2002	317	252	2,629	2,087	2,946	2,339	900	773	3,846	3,112
2003	460	215	1,405	1,222	1,865	1,437	938	640	2,803	2,077
2004	227	154	2,571	2,051	2,798	2,205	888	779	3,686	2,984
2005	716	634	2,604	2,134	3,320	2,768	2,960	2,692	6,280	5,460
2006	1,409	1,248	2,664	1,705	4,073	2,953	2,292	2,024	6,365	4,977
2007	2,156	1,621	2,610	2,159	4,766	3,780	2,765	1,981	7,531	5,761
2008	1,836	974	1,799	1,579	3,635	2,553	4,240	3,179	7,875	5,732
2009	965	784	2,462	1,909	3,427	2,693	8,532	7,926	11,959	10,619
2010	972	928	626	439	1,598	1,367	3,702	3,582	5,300	4,949
2011	913	821	1,896	1,420	2,809	2,241	7,949	7,351	10,758	9,592
2012	2,036	1,420	436	336	2,472	1,756	4,117	3,837	6,589	5,593
2013	1,861	1,252	2,816	2,025	4,677	3,277	3,487	3,176	8,164	6,453
2014	982	881	2,015	1,971	2,997	2,852	3,405	3,061	6,402	5,913
2015	1,567	1,264	2,232	1,865	3,799	3,129	4,804	3,990	8,603	7,119
Average										
2006–2015	1,470	1,119	1,956	1,541	3,425	2,660	4,529	4,011	7,955	6,671
2010–2015	1,389	1,094	1,670	1,343	3,059	2,437	4,577	4,166	7,636	6,603

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis.

PINK SALMON FISHERIES

FISHERY DESCRIPTION

Pink salmon are the most common wild stock returning to Resurrection Bay and North Gulf Coast streams. Pink salmon begin their annual migration in late July through mid-September with peak run timing occurring in mid to late August. Pink salmon runs to the NGCMA are typically largest on odd years (Figure 9). Boat operators typically do not target pink salmon.

FISHERY MANAGEMENT AND OBJECTIVES

There are no formal management objectives for pink salmon in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, the Division of Sport Fish (SF) goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks.

STOCKING PROGRAM

There is currently no pink salmon stocking program in the NGCMA.

FISHERY PERFORMANCE

From 2010 to 2015, pink salmon catch averaged 17,592 fish (Table 13, Figure 9) and ranged from 12,106 fish in 2011 to 28,256 fish in 2015; during this period, an average of 28% of the catch was harvested. On average (2010–2015), boat anglers caught the majority (85%) of the pink salmon catch; however, only 27% of those fish were harvested. The average catch for shore anglers was 2,664 pink salmon with a harvest rate of 36% (947 fish). The current trend shows a slight annual increase in the catch of pink salmon since 2000.

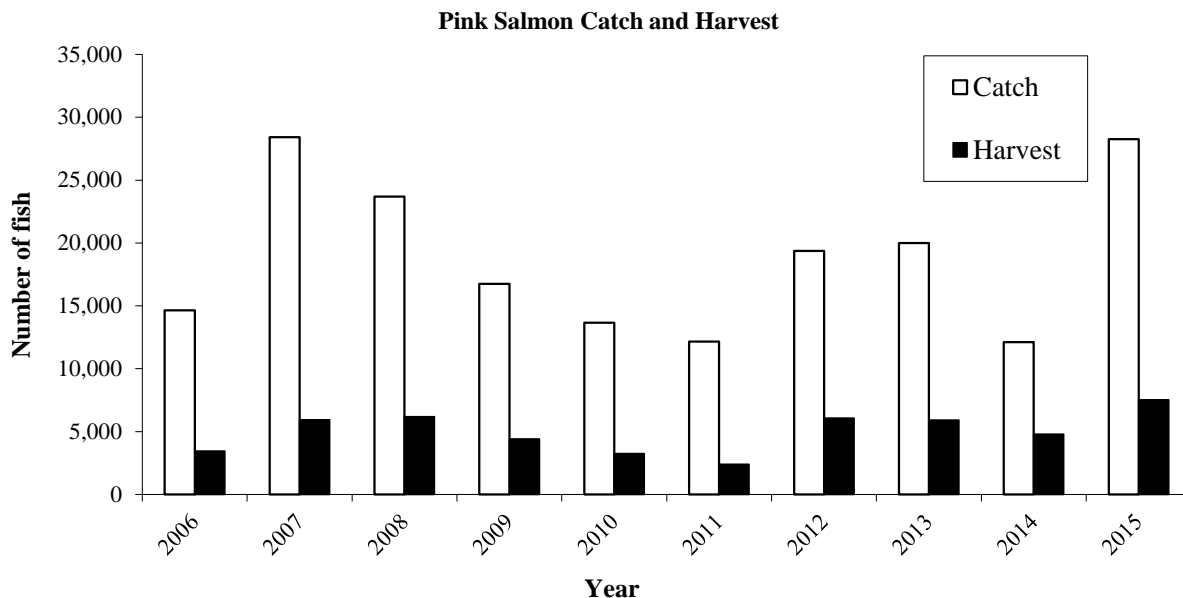


Figure 9.—Pink salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Table 13.—Pink salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Boat									
	Charter		Private		Total		Shore		Total	
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	1798	645	4,152	1,351	5,950	1,996	6,572	2,914	12,522	4,910
1997	911	298	3,376	676	4,287	974	2,647	597	6,934	1,571
1998	1131	406	5,928	1,409	7,059	1,815	2,575	1,022	9,634	2,837
1999	3,961	1,285	9,471	2,386	13,432	3,671	2,314	889	15,746	4,560
2000	2,355	791	8,189	1,681	10,544	2,472	6,848	1,411	17,392	3,883
2001	1,412	865	6,692	1,564	8,104	2,429	3,937	1,411	12,041	3,840
2002	2,736	650	8,186	2,098	10,922	2,748	5,630	1,532	16,552	4,280
2003	2,978	723	12,291	2,366	15,269	3,089	3,262	1,381	18,531	4,470
2004	1,724	426	8,140	2,920	9,864	3,346	5,665	2,257	15,529	5,603
2005	5,950	1,359	18,196	3,764	24,146	5,123	6,327	1,928	30,473	7,051
2006	1,489	402	9,428	1,941	10,917	2,343	3,727	1,109	14,644	3,452
2007	5,977	2,234	15,014	1,856	20,991	4,090	7,426	1,851	28,417	5,941
2008	3,602	1,567	13,811	3,157	17,413	4,724	6,274	1,448	23,687	6,172
2009	4,210	1,625	8,114	1,612	12,324	3,237	4,433	1,162	16,757	4,399
2010	3,695	1,434	7,916	1,437	11,611	2,871	2,052	379	13,663	3,250
2011	2,037	908	9,318	1,160	11,355	2,068	799	333	12,154	2,401
2012	4,952	2,604	13,962	3,147	18,914	5,751	459	304	19,373	6,055
2013	5,561	2,160	10,987	2,006	16,548	4,166	3,452	1,742	20,000	5,908
2014	3,872	2,433	6,348	1,643	10,220	4,076	1,886	706	12,106	4,782
2015	5,711	2,077	15,208	3,219	20,919	5,296	7,337	2,218	28,256	7,514
Average										
2006–2015	4,111	1,744	11,011	2,118	15,121	3,862	3,785	1,125	18,906	4,987
2010–2015	4,305	1,936	10,623	2,102	14,928	4,038	2,664	947	17,592	4,985

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis.

CHUM SALMON FISHERIES

FISHERY DESCRIPTION

The chum salmon fishery in the NGCMA is a relatively small fishery. Wild stocks of chum salmon spawn in most NGCMA streams from mid-July through late August with the peak of the run in late June through early August. Most of the catch and harvest is incidental for boat anglers because these anglers are targeting other species such as Chinook or coho salmon. Shore anglers targeting chum salmon frequent Spring Creek, Fourth of July Creek, the mouth of the Resurrection River, and Tonsina Creek in Resurrection Bay.

FISHERY MANAGEMENT AND OBJECTIVES

There are no formal management objectives for chum salmon in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, SF goals seek to optimize social and economic benefits, and where possible, expand opportunity to participate in diverse fisheries on these stocks.

STOCKING PROGRAM

There is currently no chum salmon stocking program in the NGCMA.

FISHERY PERFORMANCE

Catches of chum salmon vary annually in this small fishery. The annual catch of chum salmon from 2010 through 2015 was approximately 2,224 fish with an average harvest rate of about 33% (734 fish) (Table 14). Between 2010 and 2015, chum salmon catch ranged from 889 fish (2010) to 3,965 (2013) (Figure 10). The annual catch of chum salmon in 2010 (889 fish) was the lowest since the late 1990s. In 2010, 85% of the chum salmon catch was from private boats.

From 2011 to 2015, chum salmon catches improved, and 2013 had the third highest annual catch (3,965 fish) since 2000. In 2013, a majority (64%) of the chum salmon catch (2,542 fish) was by shore anglers. The 2014 chum salmon annual catch (2,007 fish) was below the 10-year average (2,367 fish). The 2015 chum salmon annual catch (3,014 fish) was above the 10-year average. The current trend for this fishery indicates an overall annual decline in catch.

Table 14.—Chum salmon catch and harvest, North Gulf Coast Management Area, 1995–2015.

Year	Boat						Shore		Total	
	Charter		Private		Total					
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	517	363	961	176	1,478	539	3,123	1,137	4,601	1,676
1997	263	248	866	241	1,129	489	1,886	256	3,015	745
1998	128	49	99	8	227	57	575	152	802	209
1999	242	79	430	61	672	140	2,621	523	3,293	663
2000	844	179	1,103	541	1,947	720	2,488	459	4,435	1,179
2001	159	29	2,144	360	2,303	389	1,014	261	3,317	650
2002	560	71	638	181	1,198	252	868	178	2,066	430
2003	288	7	1,880	138	2,168	145	1,158	118	3,326	263
2004	178	74	903	300	1,081	374	1,629	689	2,710	1,063
2005	339	153	1,177	215	1,516	368	1,743	810	3,259	1,178
2006	394	152	732	144	1,126	296	1,468	419	2,594	715
2007	405	109	339	0	744	109	873	209	1,617	318
2008	384	0	966	128	1,350	128	3,344	1,090	4,694	1,218
2009	236	168	313	175	549	343	877	237	1,426	580
2010	244	183	510	53	754	236	135	39	889	275
2011	79	32	898	97	977	129	679	309	1,656	438
2012	219	47	311	189	530	236	1,282	342	1,812	578
2013	598	443	825	267	1,423	710	2,542	781	3,965	1,491
2014	113	45	1,318	427	1,431	472	576	158	2,007	630
2015	671	355	627	382	1,298	737	1,716	256	3,014	993
Average										
2006–2015	334	153	684	186	1,018	340	1,349	384	2,367	724
2010–2015	321	184	748	236	1,069	420	1,155	314	2,224	734

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis.

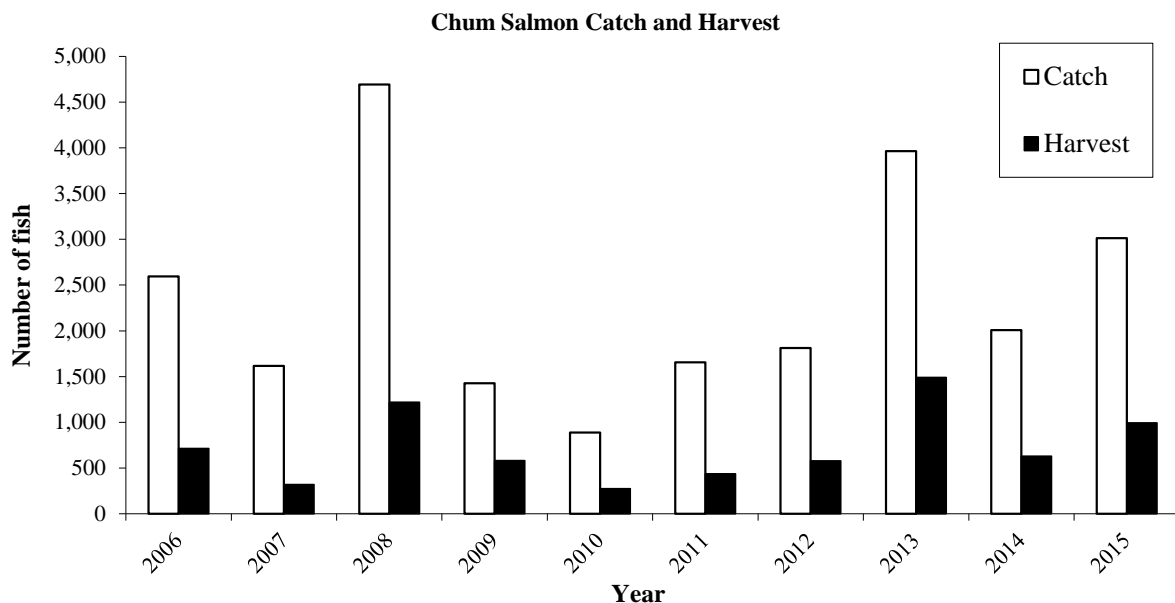


Figure 10.—Chum salmon catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

DOLLY VARDEN FISHERIES

FISHERY DESCRIPTION

Dolly Varden are available to anglers throughout the year in the NGCMA; however, peak fishing opportunities generally occur as they migrate to and from wintering and spawning areas. Peak harvest occurs in May and from mid-July through September, but much of the catch is incidental to fishing for other species. Spawning begins as early as September and may continue into November.

This fishery starts each spring as the ice melts from freshwater wintering ponds and lakes in NGCMA drainages. Anglers fish these ponds and lakes each spring before these anadromous fish emigrate to nearshore marine environments. Saltwater anglers target Dolly Varden throughout the summer until fish begin returning to overwintering areas in the fall.

FISHERY MANAGEMENT AND OBJECTIVES

There are no formal management objectives for Dolly Varden in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, SF goals seek to optimize social and economic benefits and, where possible, expand opportunity to participate in diverse fisheries on these stocks.

STOCKING PROGRAM

There is currently no Dolly Varden stocking program in the NGCMA.

FISHERY PERFORMANCE

The 2010–2015 average annual catch and harvest of Dolly Varden was 366 and 147 fish, respectively (Table 15). Shore anglers caught the majority of the fish from 2010 through 2012 (67%). Conversely, from 2013 through 2015, 62% to 97% of the Dolly Varden catch was by anglers utilizing boats.

Catch of Dolly Varden in 2010, 2011, and 2012 were historical lows (223, 218, and 232 fish; Figure 11). In 2013, the Dolly Varden catch slightly increased to 333 fish but was still low. Since 2013 the annual catch has progressively improved, although it is nowhere near the catches reported in the early 2000's.

Table 15.—Dolly Varden catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Boat						Shore		Total	
	Charter		Private		Total					
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	752	254	182	146	934	400	744	305	1,678	705
1997	396	141	645	170	1,041	311	337	183	1,378	494
1998	149	72	1,931	670	2,080	742	296	119	2,376	861
1999	125	34	242	154	367	188	55	33	422	221
2000	138	34	105	34	243	68	498	174	741	242
2001	0	0	452	108	452	108	410	108	862	216
2002	69	0	531	391	600	391	783	524	1,383	915
2003	456	72	512	189	968	261	452	392	1,420	653
2004	163	201	552	92	715	293	676	386	1,391	679
2005	11	0	184	47	195	47	185	99	380	146
2006	144	28	337	64	481	92	102	102	583	194
2007	300	0	429	72	729	72	275	148	1,004	220
2008	104	0	926	157	1,030	157	245	0	1,275	157
2009	147	0	84	136	231	136	72	29	303	165
2010	39	27	29	15	68	42	155	74	223	116
2011	0	0	89	89	89	89	129	81	218	170
2012	38	0	29	13	67	13	165	89	232	102
2013	44	27	164	53	208	80	125	95	333	175
2014	45	0	444	121	489	121	50	50	539	171
2015	466	99	163	49	629	148	19	0	648	148
Average										
2006–2015	133	18	269	77	402	95	134	67	536	162
2010–2015	105	26	153	57	258	82	107	65	366	147

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

Note: Estimates for 1996–1999 were recalculated due to an error in the original published data analysis.

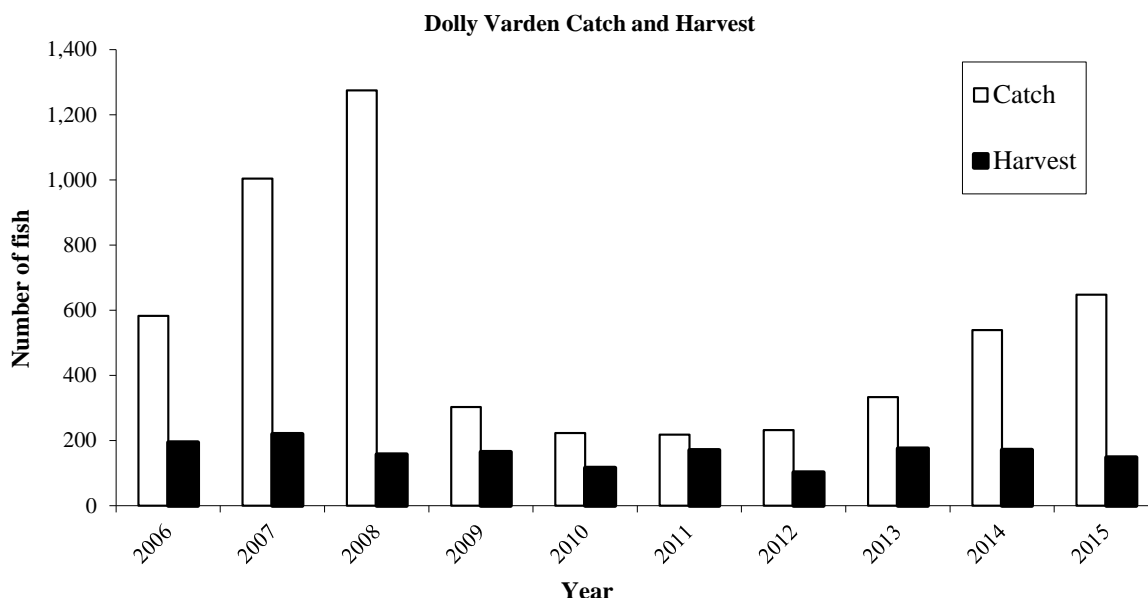


Figure 11.—Dolly Varden catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

HALIBUT FISHERIES

FISHERY DESCRIPTION

Pacific halibut are highly sought after in the marine waters of the NGCMA. On average, they make up approximately 25% of the harvest in NGCMA salt waters. Most halibut are harvested from May through early September. The average weight of sport-caught halibut ranged from 20 to 30 pounds throughout the 1990s but has since dropped steadily to around 15–16 pounds. The decline in average weight corresponds with a long-term decline in size-at-age of halibut throughout the Gulf of Alaska (Stewart and Monnahan 2016). Halibut are caught by anglers fishing from private boats and by the large charter fleet that operates out of the Port of Seward. Halibut fishing out of Seward is highly dependent upon weather. Charter vessels are typically larger than most of the private fleet, which allows them to venture farther into North Gulf Coast waters and well into Prince William Sound to fish more productive waters.

FISHERY MANAGEMENT AND OBJECTIVES

Halibut fisheries are managed principally by federal agencies under the authority of the 1953 Halibut Convention as amended by the 1979 Protocol (McCaughran and Hoag 1992), and the North Pacific Halibut Act of 1982. The International Pacific Halibut Commission (IPHC) assesses the halibut stock; conducts research to improve management; and sets legal gear, seasons, catch limits, and other regulatory measures. The IPHC also divided Convention waters into regulatory areas. The NGCMA falls within IPHC Regulatory Area 3A, which stretches from Cape Spencer to the southwest end of Kodiak Island.

In U.S. waters, the halibut resource is allocated among various sectors by the North Pacific Fishery Management Council (NPFMC) subject to approval of the Secretary of Commerce. The Council can develop regulations that are not in conflict with IPHC regulations. Examples of

NPFMC actions include establishing regulations for subsistence harvest and developing of the individual fishery quota (IFQ) system for the commercial fishery, the charter limited entry program, and catch sharing plans. In addition, the National Marine Fisheries Service (NMFS) develops regulations to implement Council actions and enforces all federal regulations.

Although ADF&G lacks direct management authority for halibut, it is involved in halibut management. The commissioner of ADF&G has a designated voting seat on the NPFMC. In addition, the SF estimates sport harvest and conducts dockside creel surveys to gather information on age, sex, and size of sport-caught fish. ADF&G summarizes this information for the IPHC and NPFMC and assists the NPFMC and NMFS with analysis and development of management measures and regulations for sport fisheries. ADF&G estimates sport harvest through the SWHS and a mandatory logbook for the guided sector. Charter operators are required under state and federal regulations to report effort, harvest, release, location, and other information for selected species, including halibut.

The halibut sport fishery statewide open season is February 1–December 31. A daily bag limit of 2 fish of any size per day was established in 1975, and a possession limit of 2 daily bag limits was implemented in 1988. The daily bag and possession limits of 2 and 4 fish, respectively, remain in place statewide for the unguided fishery and in western Alaska for guided fisheries. However, the guided fisheries in IPHC Areas 2C (Southeast Alaska) and 3A have undergone a series of regulation changes to address growth of the fishery and perceived impacts on commercial quota shareholders.

The charter fleet operated under a guideline harvest level (GHL) from September 2003 through December 2013. The GHL was created by NPFMC as a target harvest level for each IPHC area that changes in a stairstep fashion with changes in abundance. If the GHL were to be exceeded, the NPFMC would implement management measures to keep the fishery within the GHL. Although the GHL for Area 3A was exceeded by almost 10% in 2007, the NPFMC never approved changes to Area 3A charter regulations under the GHL.

In March 2007, the NPFMC approved a limited access program effective in 2011 for halibut charter vessels in Areas 2C and 3A. The program included issuance of transferable and nontransferable permits that allowed a certain number of anglers to fish for and retain halibut.

In December 2012, the NPFMC also approved a Catch Sharing Plan (CSP) to replace the GHL program. The CSP is an annual process to allocate halibut between the commercial and guided sport sectors in Area 2C and Area 3A. The Area 3A charter allocation is set as a percentage of the combined catch limit approved by the IPHC each year and includes discard mortality. The charter allocation percentage ranges from 18.9% at low levels of abundance to 14% at high levels of abundance. The CSP also provides for leasing of IFQ by charter operators for use in the charter fishery to circumvent restrictions put in place to keep the charter fishery within its allocation. Halibut obtained via leases from IFQ holders are called guided angler fish (GAF) and are taken under authority of a permit issued by NMFS. GAF harvest counts toward the commercial catch limit, and there are restrictions on its use. With passage of the CSP, the NPFMC also recommended using charter logbooks for accounting of charter harvest and release mortality, and prohibited retention of halibut by captains and crew while guiding clients.

The CSP became effective in 2014. Under the CSP, charter fishery regulations are set year to year, with no inseason changes. Each year, the NPFMC, charter industry representatives, and ADF&G engage in an annual regulatory cycle that includes preliminary harvest estimation,

identification of regulatory alternatives, analysis of those alternatives, and recommendation of management measures for the coming year. The NPFMC approves recommendations to the IPHC, which approves regulations at the IPHC annual meeting in January each year. Therefore, charter regulations may change on an annual basis to keep the charter fishery removals within allocations approved by the Council. Recent charter regulations in Area 3A have included size limits, annual limits, day of the week closures for part or all of the season, and limiting of charter trips with halibut harvest to 1 trip per day.

FISHERY PERFORMANCE

Halibut catches from the NGCMA have increased since the 1990s, with 2007 and 2008 having the highest catch and harvest observed on record (62,579 and 60,894 fish harvested, respectively). The estimated average annual sport catch of halibut in the NGCMA from 2010 to 2015 is 79,649 fish which is just below the 10-year average of 83,136 halibut (Table 16). Harvest of halibut in the NGCMA (2010–2015) averaged 53,214 fish (range: 43,514 to 60,688), which was just below the 10-year average of 54,243 fish. Slight drops in harvest have been observed every few years, with 2012 having the lowest harvest (43,512) since 2003 (42,905) (Figure 12). However in 2015, the NGCMA halibut harvest was the third largest recorded since 1977.

While harvest of halibut by the charter fleet has continued to increase since 2000, the catch and harvest by private anglers appears steady (e.g., Figure 13). Catch by the charter fleet reached an all-time high in 2011 followed by a subsequent decline in 2012. In addition, charter harvest in 2011 was the fourth largest in the last 39 years although a decline was observed in 2012 (Figure 13). Since 2013, charter harvest has increased. On average from 2006 to 2015, anglers retained approximately 65% of the halibut they catch; however, from 2013 to 2015 anglers retained more halibut on average (71%) (calculated from Table 16).

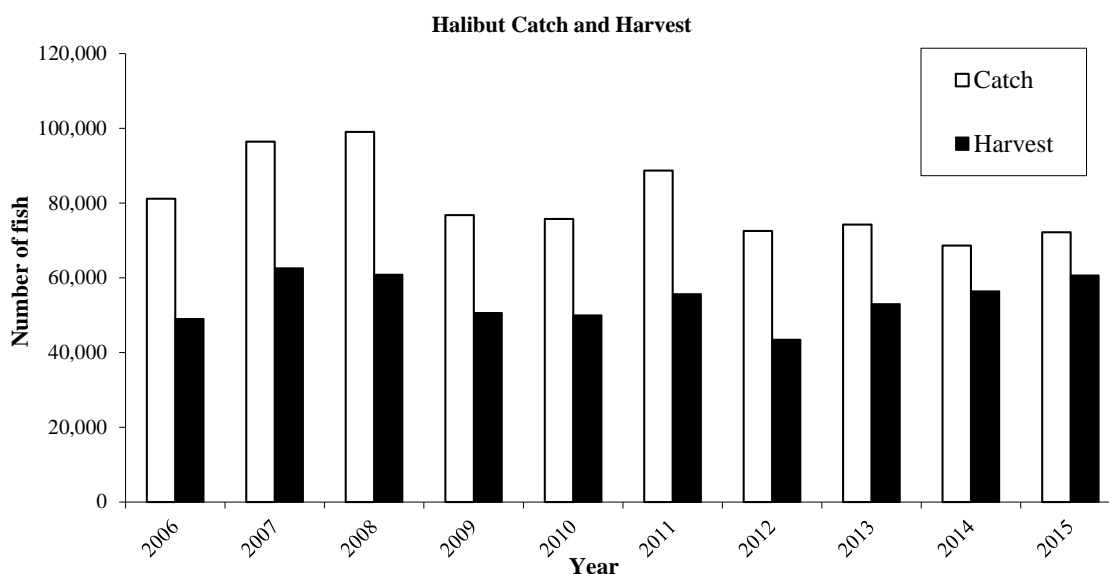


Figure 12.—Halibut catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: 2000–2013 (Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited September 8, 2016]. Available from Division of Sport Fish, Research and Technical Services.); 2014–2015 (Saltwater Logbook Database. 2nd edition. Alaska Department of Fish and Game, Division of Sport Fish. 2006 to present. [Accessed October 7, 2016]. [URL not publicly available as some information is confidential. Contact Research and Technical Services for data requests.]

Table 16.—Halibut catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Charter		Private		Total	
	Catch	Harvest	Catch	Harvest	Catch	Harvest
1996	24,622	14,700	18,039	10,887	42,661	25,587
1997	32,281	17,034	20,123	12,672	52,404	29,706
1998	25,760	16,101	15,987	10,042	41,747	26,143
1999	21,946	15,509	19,993	12,287	41,939	27,796
2000	23,917	17,141	19,736	13,740	43,653	30,881
2001	32,775	20,795	14,303	9,716	47,078	30,511
2002	33,654	22,211	18,283	13,772	51,937	35,983
2003	38,663	26,709	22,361	16,196	61,024	42,905
2004	59,240	34,436	36,969	22,142	96,209	56,578
2005	54,619	35,605	27,732	18,279	82,351	53,884
2006	55,220	32,387	25,984	16,681	81,204	49,068
2007	60,629	37,051	35,820	25,528	96,449	62,579
2008	61,320	35,352	37,731	25,542	99,051	60,894
2009	45,636	30,491	31,125	20,113	76,761	50,604
2010	53,230	33,359	22,530	16,618	75,760	49,977
2011	62,743	39,250	25,965	16,432	88,708	55,682
2012	53,929	32,727	18,597	10,787	72,526	43,514
2013	54,468	39,594	19,807	13,403	74,275	52,997
2014 ^a	47,852	42,337	20,778	14,090	68,630	56,427
2015 ^a	50,944	46,321	21,243	14,367	72,187	60,688
Average						
2006–2015	54,597	36,887	25,958	17,356	80,555	54,243
2010–2015	53,861	38,931	21,487	14,283	75,348	53,214

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

a As specified in the Halibut Catch Sharing Plan for Areas 2C and 3A, which became effective in 2014, charter estimates for 2014 and 2015 come from Saltwater Logbook Database. 2nd edition. Alaska Department of Fish and Game, Division of Sport Fish. 2006 to present. (Accessed October 7, 2016). (URL not publicly available as some information is confidential. Contact Research and Technical Services for data requests.)

Halibut Harvest by Angler Type in NGCMA

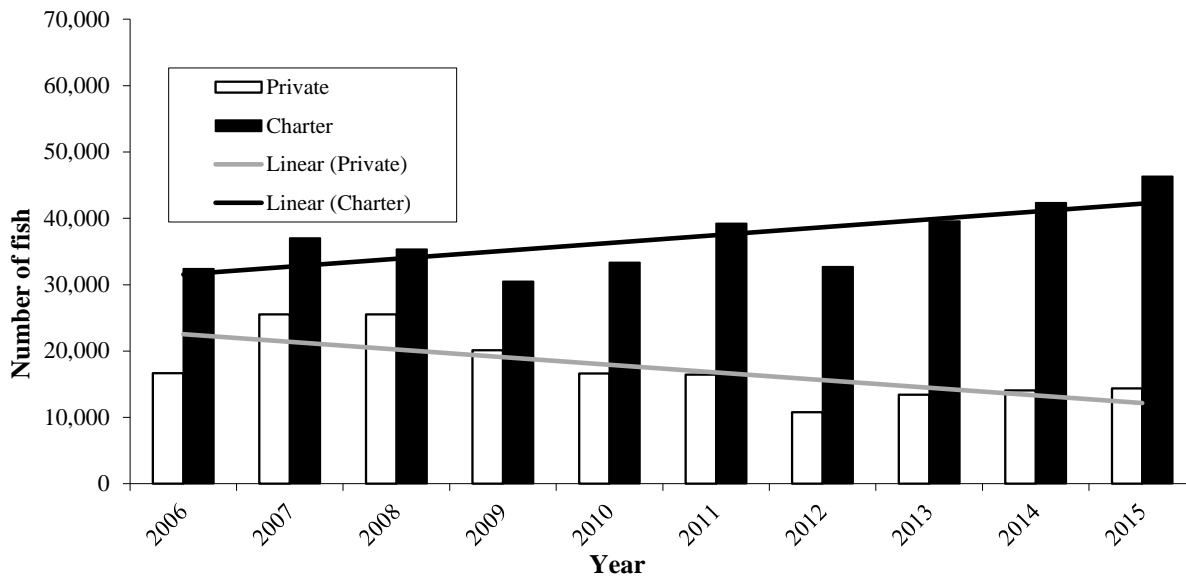


Figure 13.—Halibut catch and harvest by charter and private boat in the North Gulf Coast Management Area, 2006–2015.

Source: 2000–2013 (Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited September 8, 2016]. Available from Division of Sport Fish, Research and Technical Services.); 2014–2015 (Saltwater Logbook Database. 2nd edition. Alaska Department of Fish and Game, Division of Sport Fish. 2006 to present. [Accessed October 7, 2016]. [URL not publicly available as some information is confidential. Contact Research and Technical Services for data requests.]

ROCKFISH FISHERIES

FISHERY DESCRIPTION

Rockfish are a popular target of sport anglers fishing NGCMA marine waters. A variety of rockfishes, species of the genera *Sebastes*, inhabit the marine waters of the NGCMA. The sport fishery primarily targets nonpelagic (demersal) and pelagic rockfish. Although many species of rockfish have been identified in the NGCMA, the most commonly harvested *Sebastes* species are black rockfish (*S. melanops*; pelagic) and yelloweye rockfish (*S. ruberrimus*; nonpelagic) followed by quillback (*S. maliger*; nonpelagic), dark (*S. ciliates*, pelagic), and dusky rockfish (*S. variabilis*; pelagic). The proportion of black rockfish harvested in the rockfish fishery is on average approximately 70% while yelloweye rockfish make up approximately 14%. Quillback, dusky, and dark rockfish combined make up approximately 14% while all other rockfish species combined make up the remaining 2% of the harvest (Meyer and Failor *In prep*). Although available year-round, most rockfish are harvested in the sport fishery from May through early September. Management issues and stock status are discussed in Meyer and Stock (2002).

FISHERY MANAGEMENT AND OBJECTIVES

Harvest limits for rockfish in the NGCMA are 4 fish per day, 8 in possession (only 1 per day and 2 in possession may be nonpelagic), with no size restrictions. This limit was put into effect during the 2007/2008 BOF meeting for NGCMA. There are also no catch and release regulations in the NGCMA, unlike the nearby Prince William Sound rockfish fishery, where anglers are required to retain the first 2 nonpelagic species they catch.

Due to a lack of stock assessment data, no formal fishery objectives have been established for rockfish sport fisheries in the NGCMA. ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, SF goals seek to optimize social and economic benefits, and where possible, expand opportunity to participate in diverse fisheries on these stocks. However, the following management approaches are used:

- 1) a daily limit of 1 fish per day for non-pelagic species and a total daily limit of 4 rockfish
- 2) public education regarding rockfish life history, how to avoid catching these fish, and alternative methods of releasing sport caught rockfish (<http://www.adfg.alaska.gov/index.cfm?adfg=fishingSportFishingInfo.rockfishconservation>)

Rockfish management can be challenging, and many rockfish stocks in California, Oregon, Washington, and British Columbia are depleted. The Division of Sport Fish groundfish harvest monitoring program provides estimates of species, age, length, and sex composition, as well as the spatial distribution of the rockfish sport harvest. This program is effective at describing harvest, but these data alone cannot be used to evaluate stock status or develop management objectives. The Division of Commercial Fisheries also collects fishing independent data. A meaningful index of abundance would have to be developed before a program could be implemented to estimate stock status independent of the rockfish fisheries.

Rockfish captured at depths greater than 60 ft often suffer physical damage associated with forced decompression (called barotrauma). Fish suffering barotrauma are believed to have a poor probability of surviving if released; however, a recent study by ADF&G in Prince William Sound found that discard survival of yelloweye rockfish released at depth was 98% versus a maximum 22% submergence success when these fish were released at the surface (Hochhalter and Reed 2011; Hochhalter 2012). On average, over 20,000 rockfish are released annually by NGCMA sport anglers. Results of these and other barotrauma studies have lead ADF&G to encourage the use of deepwater release devices in all Alaska marine waters when a rockfish needs to be released. Beginning in 2013, Southeast Alaska charter operators were required to use deepwater release devices for all nonpelagic rockfish released. It is unknown exactly what percentage are released using a deepwater release device versus at the surface throughout Alaska; however, preliminary data collected from 2013 to 2015 by port samplers indicates that some charter and private operators in the NGCMA are choosing to use a deepwater release device although no regulation requirements are in place requiring this (Meyer and Failor, *In prep*).

FISHERY PERFORMANCE

The estimated average annual sport catch of rockfish from the NGCMA during 2010–2015 was 69,612 fish (Table 17), with an average harvest rate of approximately 72% (50,375 fish). Prior to 2010 (1996–2009), the overall average harvest rate was approximately 60% for rockfish in the NGCMA. This indicates that more rockfish are currently being retained in the NGCMA sport fishery than in the past; in 2015, the highest retention of rockfish catch was observed (77%).

Trends in rockfish catch and harvest numbers in the NGCMA have been up and down over the last 26 years but since 2000, there have been trends of increasing catch and harvest (Figure 14). From 1996 to 2009, annual rockfish catch and harvest was on average just under 58,000 and 35,000, respectively. The average annual catch and harvest from 2010 to 2015, as well in the last 6 years, increased by over 18,000 fish. In 2015, rockfish harvest was at an all-time high,

exceeding the recent 10-year average by well over 10,000 fish. An increase of catch and harvest from 2010 to 2015 was observed most strongly in charter fleet. Historically, the rate of harvest by the charter fleet and private anglers has averaged 69% and 56%, respectively. From 2010 to 2015 this increased to 79% and 63% for the charter fleet and private anglers, respectively.

Table 17.—Rockfish catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Charter		Private		Total		
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Released
1996	12,702	9,916	21,850	12,543	34,552	22,459	12,093
1997	11,856	7,673	26,576	14,817	38,432	22,490	15,942
1998	12,287	7,584	29,760	14,289	42,047	21,873	20,174
1999	15,795	9,418	27,209	15,819	43,004	25,237	17,767
2000	17,510	11,414	40,128	20,617	57,638	32,031	25,607
2001	23,400	15,966	33,104	16,494	56,504	32,460	24,044
2002	26,274	19,162	35,135	20,671	61,409	39,833	21,576
2003	21,499	14,007	28,337	16,387	49,836	30,394	19,442
2004	33,076	20,908	48,226	26,423	81,302	47,331	33,971
2005	22,787	16,920	41,574	21,592	64,361	38,512	25,849
2006	24,245	16,665	39,782	22,008	64,027	38,673	25,354
2007	28,542	20,322	38,261	24,062	66,803	44,384	22,419
2008	32,619	23,499	41,772	25,418	74,391	48,917	25,474
2009	25,538	18,708	51,125	27,339	76,663	46,047	30,616
2010	31,628	24,085	34,456	23,129	66,084	47,214	18,870
2011	37,213	28,164	33,194	18,511	70,407	46,675	23,732
2012	37,337	28,962	18,715	11,505	56,052	40,467	15,585
2013	39,060	32,845	30,181	18,932	69,241	51,777	17,464
2014	42,303	34,799	36,321	21,949	78,624	56,748	21,876
2015	51,164	41,163	26,098	18,207	77,262	59,370	17,892
Average							
2006–2015	34,965	26,921	34,991	21,106	69,955	48,027	21,928
2010–2015	39,784	31,670	29,828	18,706	69,612	50,375	19,237

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

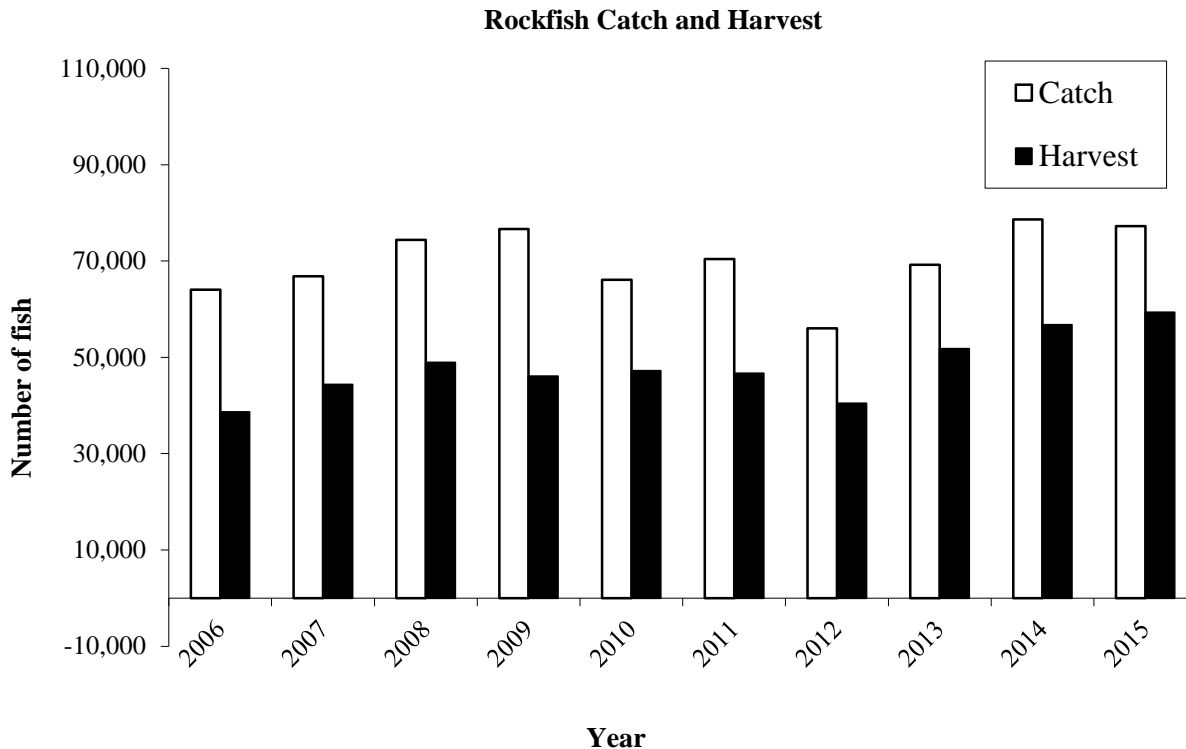


Figure 14.—Rockfish catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

LINGCOD FISHERIES

FISHERY DESCRIPTION

Lingcod are targeted by anglers in the NGCMA and are commonly found along the outer North Gulf Coast. They feed on many types of fish, crustaceans, octopuses, and can be cannibalistic. Lingcod prefer rocky reef habitats and typically do not stray far from their home reef (Barss and Demory 1989; Jagielo 1990). However, some fish move great distances and tagged lingcod have been caught as much as 50 kilometers from their release site (Stahl et al. 2014). Lingcod harvested in the NGCMA typically range in age from 9 to 20 years old (B. Failor, Research Biologist, ADF&G, Homer, personal communication). They commonly exceed 1 meter in length and weigh more than 50 pounds. Growth is relatively rapid with both sexes reaching 50-60 cm by age 4 (Meyer 1992). Unlike rockfish, lingcod have no swim bladder and can be released with a high expectation of survival.

FISHERY MANAGEMENT AND OBJECTIVES

The current stock status of lingcod in North Gulf Coast waters is unknown and ADF&G has no fishery independent assessment tool. Due to a lack of stock assessment data, no formal fishery objectives have been established for lingcod sport fisheries in the NGCMA. However, ADF&G has a constitutional mandate to manage on the principle of sustained yield. Within the sustained yield principle, SF goals seek to optimize social and economic benefits, and where possible,

expand opportunity to participate in diverse fisheries on these stocks. Within the NGCMA, the following are used as a management approach:

- 1) a daily bag limit of 1 per day, 1 in possession
- 2) seasonal closure to protect spawning fish from January 1 to June 30
- 3) a 35-inch minimum size limit for both sport and commercial fisheries allows most fish the opportunity to spawn at least once before reaching a harvestable size
- 4) all waters north of a line between Aialik Cape and Cape Resurrection are closed to lingcod fishing (Resurrection Bay)

Waters in Resurrection Bay are closed to commercial and sport fishing to rebuild stocks. The proximity of Resurrection Bay to the Port of Seward makes them highly susceptible to excessive harvest if anglers are allowed a targeted lingcod fishery in Resurrection Bay. Current efforts to assess sport removals of lingcod from outside of the Resurrection Bay for the NGCMA comes mainly from the Division of Sport Fish groundfish harvest monitoring program, which provides baseline biological data from the lingcod sport fisheries throughout Southcentral Alaska through port sampling and creel surveys. This information, along with data from the Saltwater Charter Logbook database and the Statewide Harvest Survey are all integral to the management of the sport fishery. Other management activities consist of attending public meetings and working with the local Fish and Game Advisory Committee. Transect surveys using remotely operated vehicles (ROVs) have been conducted by the Division of Commercial Fisheries in selected areas of the NGCMA (Byerly and Goldman. 2015); however, these surveys have been conducted intermittently over the last 7 years and data from these surveys are still being in processed and are unlikely to provide enough information to assist with monitoring this fishery.

FISHERY PERFORMANCE

The estimated average annual sport catch of lingcod from the NGCMA for 2010–2015 was 12,431 fish (Table 18) and harvest averaged 6,460. Historically (1996–2009), the overall average harvest rate was 42% for lingcod in NGCMA but from 2010 to 2015, the harvest rate increased to nearly 53%. Catch and harvest of lingcod peaked in 2008 (Figure 15), with a catch of 23,940 and a harvest of 9,163. Since then, harvest has decreased and has not exceeded 7,399 since 2010. However, catch has decreased proportionately more than harvest such that larger harvest rates by the charter fleet have been observed. In 2015 harvest rate by the charter fleet nearly exceeded 70% of their annual catch. Historically, the harvest rate for the charter fleet was closer to 50%.

Catch and harvest numbers for lingcod in the NGCMA have varied over the years. In 2008, catch and harvest in numbers of fish peaked for lingcod in the NGCMA. Since 2008, catch has decreased annually and while harvest dropped in 2009, it has remained relatively stable since 2010. Total catch in 2015 was the lowest observed since 1999 while harvest was the lowest observed since 2004. During the 1990s, catches from the charter industry averaged just over 40% of the total annual catch (both private anglers and the charter fleet combined); however, during this reporting period (2010–2015) catch by the charter industry exceeded 66%. Harvest during this same period has demonstrated a similar trend with approximately 50% of the harvest coming from the charter industry during the 1990s followed by an increase to nearly 75% of total harvest coming from the charter fleet.

Table 18.—Lingcod catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Charter		Private		Total		Percent harvest
	Catch	Harvest	Catch	Harvest	Catch	Harvest	
1996	2,406	1,355	3,552	1,460	5,958	2,815	47.2
1997	2,806	1,380	5,099	1,677	7,905	3,057	38.7
1998	2,942	1,507	3,463	839	6,405	2,346	36.6
1999	3,631	1,662	4,808	1,783	8,439	3,445	40.8
2000	4,655	2,561	8,408	3,004	13,063	5,565	42.6
2001	4,428	2,341	4,263	1,353	8,691	3,694	42.5
2002	4,240	2,247	5,492	1,911	9,732	4,158	42.7
2003	5,359	2,582	4,160	1,627	9,519	4,209	44.2
2004	5,720	2,979	6,226	2,087	11,946	5,066	42.4
2005	6,997	3,391	5,899	2,060	12,896	5,451	42.3
2006	8,979	4,385	5,806	1,892	14,785	6,277	42.5
2007	12,358	6,093	8,371	2,954	20,729	9,047	43.6
2008	14,215	5,688	9,725	3,475	23,940	9,163	38.3
2009	8,740	4,113	9,757	2,684	18,497	6,797	36.7
2010	8,590	5,131	5,592	2,268	14,182	7,399	52.2
2011	9,343	5,488	5,443	1,747	14,786	7,235	48.9
2012	9,828	5,599	3,388	1,181	13,216	6,780	51.3
2013	8,436	4,196	4,996	2,230	13,432	6,426	47.8
2014	6,593	4,254	3,506	1,220	10,099	5,474	54.2
2015	6,258	4,360	2,613	1,084	8,871	5,444	61.4
Average							
2006–2015	9,334	4,931	5,920	2,074	15,254	7,004	47.7
2010–2015	8,175	4,838	4,256	1,622	12,431	6,460	52.6

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

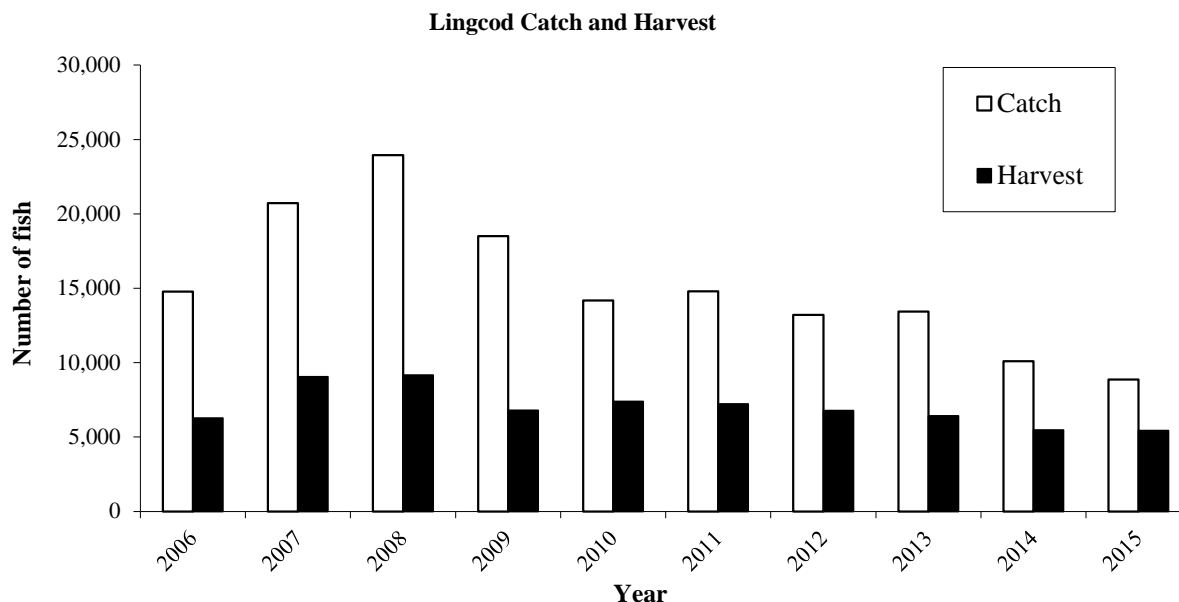


Figure 15.—Lingcod catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

SHARKS

FISHERY DESCRIPTION

The 3 most commonly caught sharks in NGCMA are the salmon shark (*Lamna ditropis*), North Pacific spiny dogfish (*Squalis suckleyi* previously *Squalus acanthias*; Ebert et al. 2010), and the Pacific sleeper shark (*Somniosus pacificus*). Although all 3 species are caught incidentally in other fisheries, typically anglers will target salmon sharks out of the Port of Seward if the goal is to catch a shark; however historically, spiny dogfish made up about 95% of the shark catch in the NGCMA (Meyer and Stock 2002). Pacific sleeper sharks have an inedible flesh that may be poisonous and these sharks are rarely kept. Anglers fishing for halibut and other groundfish generally catch these sharks incidentally. From 1998 through 2000, only 1.6% of spiny dogfish caught by anglers were retained (Meyer and Stock 2002). From 2010 to 2015, only 2.4% of all sharks caught in the NGCMA were retained, which is similar to the historical harvest data (3.8%, excluding 1996).

Salmon sharks and spiny dogfish are both slow growing, late to mature species. Both are ovoviviparous, giving birth to live young called pups. The average litter size for salmon sharks is 4–5 pups but they do not reproduce annually, whereas spiny dogfish give birth to an average of 9 pups each cycle (every two years). Salmon sharks live to around 20 years old, whereas dogfish live to be more than 100 years old (Tribuzio et al. 2008). Both species are pelagic and are known to move great distances.

During 2005 and 2006, the shark catch by anglers based out of the Port of Seward increased considerably from a transient school of spiny dogfish that had moved into the North Gulf Coast. However, based on the low percentage of spiny dogfish harvested (2% of the catch) by sport

anglers, these fish are not desirable and there is potential for wanton waste. When locally abundant, spiny dogfish can be a nuisance for charter and private boat anglers.

FISHERY MANAGEMENT AND OBJECTIVES

Due to a lack of stock assessment data, no formal fishery objectives have been established for shark sport fisheries (species of the Orders Lamniformes, Squaliformes, or Carcharhiniformes) in the NGCMA. The statewide *Sport Shark Fishery Management Plan* (5AAC 75.012, Appendix A1) states that ADF&G shall manage shark sport fisheries for sustained yield. Within the sustained yield principle, SF goals seek to optimize social and economic benefits, and where possible, expand opportunity to participate in diverse fisheries on these stocks. However, the following are used as a sport management approach:

- 1) a daily bag limit of 1 fish per day, 1 in possession and an annual limit of 2 sharks with the exception of spiny dogfish that have a daily bag limit of 5 fish per day, 5 in possession and no annual limit
- 2) sport harvest of all sharks covered under the annual limit must be recorded on a fishing license or harvest record card

The Division of Commercial Fisheries groundfish harvest monitoring program collects information on age, length, sex, and location of harvested salmon sharks, Pacific sleeper sharks, and spiny dogfish in order to develop a time series of data on these fish. To help manage these species, ADF&G is cooperating with other shark researchers to gain more information about age, growth, diet, migration, and the thermal biology of sharks. Although there are no formal objectives with respect to the shark fishery, it is hoped that the harvest of these species can be characterized in the future using several years of data.

The tendency for sharks to congregate in nearshore waters during the summer makes them particularly vulnerable to sport anglers. This, combined with more media coverage of shark fishing, has increased the popularity of this big game fish. The vulnerability of sharks to overexploitation is well documented (Walker 1998).

FISHERY PERFORMANCE

The catch and harvest of sharks peaked to a record high in 2005 followed by a decrease over subsequent years. Overall, the catch and harvest of sharks in the NGCMA appears to be declining; however, both catch and harvest vary from year to year. From 2010 to 2015, the harvest rate averaged 2.4% (range 4–7.5%). This is similar to the harvest rate that was previously observed from 2000–2009 (2.6%).

The average annual catch during this reporting period (2010–2015) was 3,612 fish. In 2012, harvest of sharks was the lowest ever observed (6), and the catch in 2012 (1,666) was the lowest observed since 1999 (Table 18, Figure 16).

Table 19.—Shark catch and harvest in the North Gulf Coast Management Area, 1996–2015.

Year	Charter		Private		Total		Percent harvest
	Catch	Harvest	Catch	Harvest	Catch	Harvest	
1996	0	0	39	22	39	22	56.4
1997	2,176	82	278	138	2,454	220	9.0
1998	1,170	89	1,667	129	2,837	218	7.7
1999	483	24	1,094	210	1,577	234	14.8
2000	1,637	108	2,276	118	3,913	226	5.8
2001	4,787	52	1,791	16	6,578	68	1.0
2002	1,160	133	998	44	2,158	177	8.2
2003	4,412	147	3,337	24	7,749	171	2.2
2004	3,796	23	1,548	87	5,344	110	2.1
2005	13,385	260	7,655	98	21,040	358	1.7
2006	9,124	47	3,402	69	12,526	116	0.9
2007	8,238	95	5,468	37	13,706	132	1.0
2008	2,704	43	3,167	92	5,871	135	2.3
2009	2,764	25	1,823	0	4,587	25	0.5
2010	2,548	8	2,896	15	5,444	23	0.4
2011	2,055	56	1,574	0	3,629	56	1.5
2012	1,224	6	442	0	1,666	6	0.4
2013	1,319	21	1,388	181	2,707	202	7.5
2014	3,632	228	1,677	0	5,309	228	4.3
2015	1,264	9	1,655	9	2,919	18	0.6
Average							
2006–2015	3,487	54	2,349	40	5,836	94	1.9
2010–2015	2,007	55	1,605	34	3,612	89	2.4

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

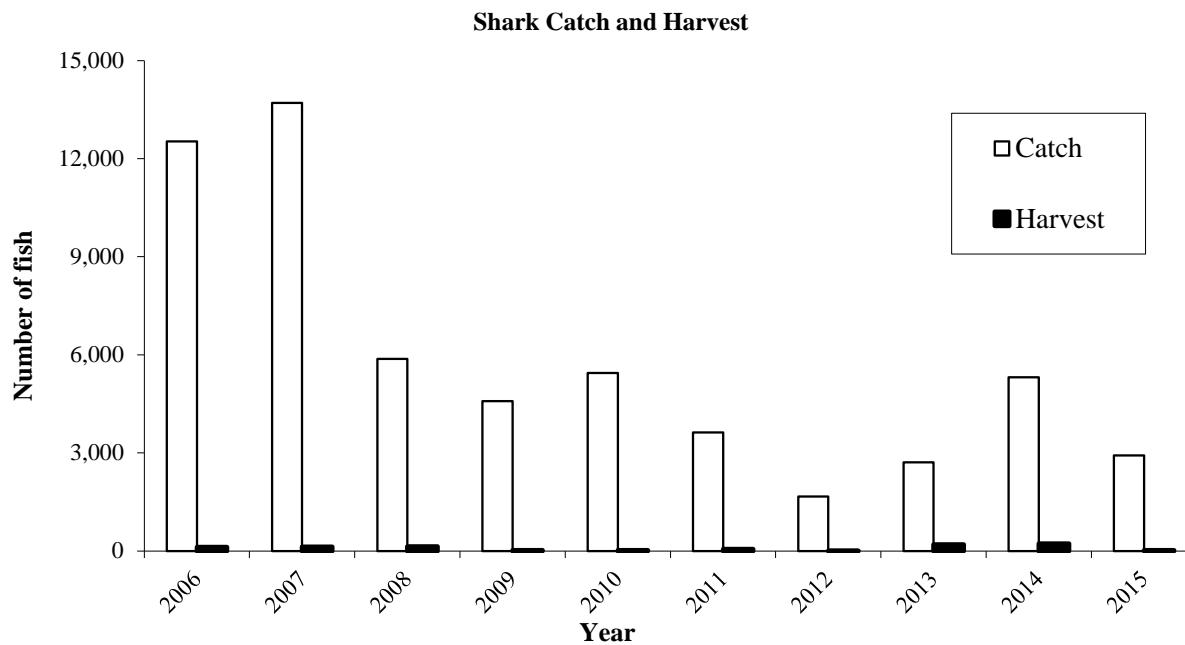


Figure 16.—Shark catch and harvest in the North Gulf Coast Management Area, 2006–2015.

Source: Alaska Sport Fishing Survey database [Intranet]. 1996–present. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited September 8, 2016). Available from Division of Sport Fish, Research and Technical Services.

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APPENDIX A: NORTH GULF COAST MANAGEMENT PLANS

5 AAC 21.373 Trail Lakes Hatchery Sockeye Salmon Management Plan

(a) The purpose of the management plan in this section is to provide an equitable distribution of the harvest of hatchery-produced salmon among seine and set gillnet commercial fisheries and the cost recovery fishery conducted by the Trail Lakes Hatchery operator. The department, in consultation with the hatchery operator, shall primarily manage the Lower Cook Inlet Special Harvest Areas salmon fisheries in the Southern District to achieve the Cook Inlet Aquaculture Association cost recovery harvest goal and the broodstock escapement goals for the Trail Lake Hatchery.

(b) The Cook Inlet Aquaculture Association, or the association's agent or contractor, may harvest salmon within the China Poot and Hazel Lake Special Harvest Area, Tutka Bay Special Harvest Area, Kirschner Lake Special Harvest Area, and Bear Lake Special Harvest Area during periods established by emergency order on or after the third Monday in May, using purse seines, hand purse seines, beach seines, and weirs. The China Poot and Hazel Lake Special Harvest Area, Tutka Bay Special Harvest Area, Kirschner Lake Special Harvest Area, and Bear Lake Special Harvest Area will remain closed to commercial fishing until the cost recovery goal and broodstock goal for the Trail Lake Hatchery is achieved or the department projects that the goals will be achieved.

(c) It is the intent of the Board of Fisheries that

- 1) any enhancement of sockeye salmon will not cause a net loss of coho salmon smolt production from Bear Lake;
- 2) any enhancement of sockeye salmon in Bear Lake will maintain the early run timing of the indigenous stocks;
- 3) the prime objective of any Bear Lake sockeye salmon enhancement is to provide the opportunity for a commercial sockeye salmon fishery conducted with minimal conflict with the noncommercial fisheries.

(d) No management restrictions will be imposed on the noncommercial fisheries in order to achieve the Trail Lakes Hatchery objectives for sockeye salmon.

(e) For the purposes of this section, the Lower Cook Inlet Special Harvest Areas are described as follows:

- 1) China Poot and Hazel Lake Special Harvest Area consists of the marine waters of the China Poot Bay Subdistrict in the Southern District shoreward of and enclosed by a line from lat 59°34.66'N, long 151° 19.27'W, to lat 59°35.08'N, long 151°19.77'W, to lat 59°33.09'N, long 151°25.22'W, to lat 59°32.84'N, long 151°24.90'W;
- 2) Tutka Bay Special Harvest Area consists of the marine waters of the Tutka Bay Subdistrict in the Southern District southeast and shoreward of a line from lat 59°30.23'N, long 151°28.23'W to lat 59°28.63'N, long 151°30.37'W, including Tutka Bay Lagoon;

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- 3) Kirschner Lake Special Harvest Area consists of the marine waters of the Bruin Bay Subdistrict in the Kamishak Bay District northwest and shoreward of a line from lat 59°25.17'N, long 153°50.50'W to lat 59°23.17'N lat, long 153°56.90'W;
- 4) Bear Lake Special Harvest Area consists of the marine waters of Resurrection Bay in the Eastern District north of the latitude of Caines Head at approximately lat 59°58.93'N, and the fresh waters of Bear Creek, Salmon Creek, and Resurrection River downstream from and including the Bear Creek weir.

(f) The provisions of this section do not apply after May 1, 2011.

History: Eff. 8/23/2009, Register 191

5 AAC 21.375. BEAR LAKE MANAGEMENT PLAN.

Repealed. (Eff. 6/10/89, Register 110; am 2/13/2005, Register 173; repealed 8/23/2009, Register 191)

5 AAC 21.376. RESURRECTION BAY SALMON MANAGEMENT PLAN.

(a) Since the beginning of significant commercial harvests of pink and chum salmon in Resurrection Bay, there have been some conflicts between sport and commercial fishermen. The issues are the protection of coho and king salmon for the sport fishery, and the management of surplus pink and chum salmon stocks in a manner that provides for a commercial fishery while minimizing the incidental catch of coho and king salmon.

(b) The commissioner shall, by emergency order,

- 1) manage Resurrection Bay coho and king salmon stocks primarily for recreational use;
- 2) manage the indigenous pink and chum salmon stocks primarily for commercial use, insofar as that harvest does not interfere in time or area with the recreational fishery;
- 3) manage the commercial fishery in Resurrection Bay in a manner that does not interfere with the recreational fishery.

History: Eff. 6/10/89, Register 110; 6/11/2005, Register 126

5 AAC 58.065. NORTHRESURRECTION BAY SALMON MANAGEMENT PLAN.5 AAC 58.065. North Gulf Coast King Salmon Sport Fishery Management Plan.

(a) The purpose of the management plan under this section is to meet the Board of Fisheries' goal of directing the king salmon sport fishing effort on hatchery stocks in Resurrection Bay and stabilizing the sport harvest of king salmon in the North Gulf Coast.

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(b) In the king salmon sport fishery,

- 1) from January 1 through December 31, outside of the Resurrection Bay Terminal Harvest Area, the bag and possession limit for king salmon is one fish, with no size limit;
- 2) within the Resurrection Bay Terminal Harvest Area,
 - (A) from May 1 through August 31, the bag and possession limit for king salmon is two fish; with no size limit;
 - (B) from September 1 through April 30, the bag and possession limit for king salmon is one fish, with no size limit;
- 3) in the North Gulf Coast, the annual limit and harvest record specified in 5 AAC 58.022 does not apply.

(c) For the purposes of this section, the

- 1) North Gulf Coast consists of the salt waters between Gore Point at 59° 12.00' N. lat., 150° 57.85' W. long. and the longitude of Cape Fairfield (148° 50.25' W. long.);
- 2) Resurrection Bay Terminal Harvest Area consists of the salt waters north of a line between Cape Resurrection and Aialik Cape. (Eff. 12/29/2002, Register 164; am 4/24/2009, Register 190; am 2/23/2014, Register 209)

Authority: AS 16.05.251

5 AAC 75.012. Sport Shark Fishery Management Plan.

(a) The department shall manage sport shark fisheries for sustained yield.

(b) Recognizing the lack of stock status information, the potential for rapid growth in the sport shark fishery, and the potential for over-exploitation, the following provisions apply to the sport shark fishery:

- 1) sharks may be taken from January 1 through December 31; the bag and possession limits for sharks in salt water is one fish;
- 2) the annual limit for sharks in salt water is two fish;
- 3) a nontransferable harvest record is required and must be in the possession of each angler sport fishing for sharks in salt water; the harvest record
 - (A) for a licensed angler is located on the back of the angler's sport fishing license;
 - (B) for an angler not required to have a sport fishing license may be obtained, without charge, from department offices and sport fishing license vendors throughout the state;
- 4) immediately upon landing a shark from salt water, an angler shall enter the date, location (water body), and species of the catch, in ink, on the harvest record; and

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- 5) notwithstanding 1–4 of this subsection, the bag and possession limit for spiny dogfish is five fish, with no size or annual limit; a harvest record is not required for spiny dogfish.

(c) The provisions of (b) of this section also apply in the adjoining waters of the exclusive economic zone.

(d) For the purpose of this section, “shark” means a species of the orders Lamniformes, Squaliformes, or Carcharhiniformes. (Eff. 4/23/98, Register 146; am 6/10/2010, Register 194; am 6/1/2013, Register 206)

Authority: AS 16.05.251 AS 16.10.190